United States Department of Agriculture

NRCS

Natural Resources Conservation Service

In cooperation with Kentucky Natural Resources and Environmental Protection Cabinet and Kentucky Agricultural Experiment Station

Soil Survey of Lawrence and Martin Counties, Kentucky

How To Use This Soil Survey

General Soil Maps

The general soil maps, which are color maps, show the survey area divided into groups of associated soils called general soil map units. These maps are useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the maps, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

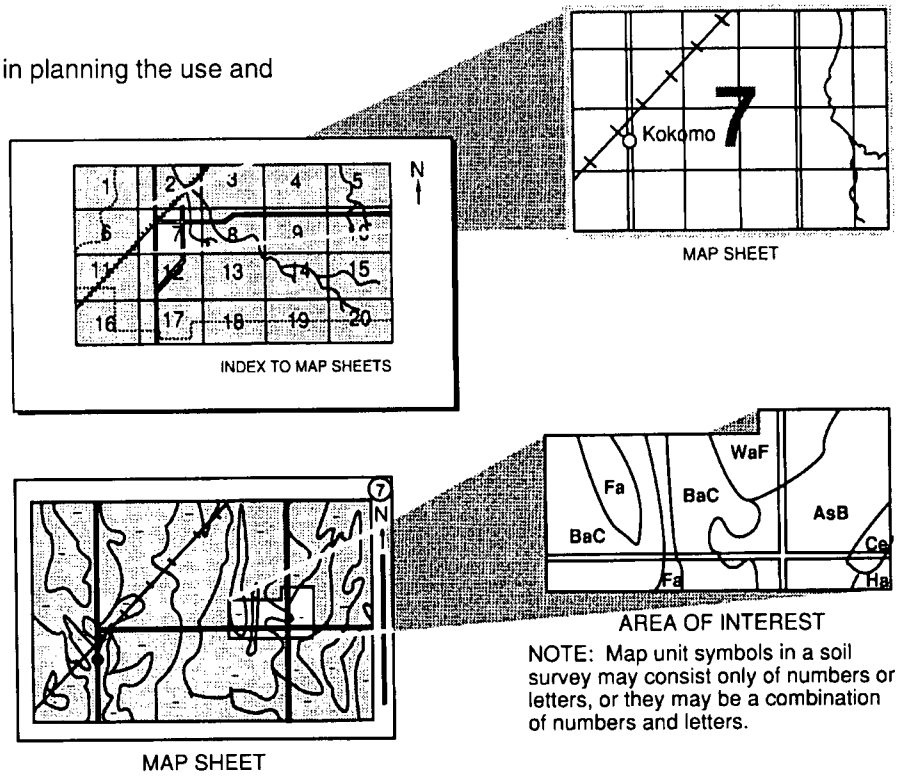
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1995. Soil names and descriptions were approved in 1995. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1995. This survey was made cooperatively by the Natural Resources Conservation Service, the Kentucky Natural Resources and Environmental Protection Cabinet, and the Kentucky Agricultural Experiment Station. The survey is part of the technical assistance furnished to the Lawrence County Conservation District and the Martin County Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

The United States Department of Agriculture (USDA) prohibits discrimination in all of its programs on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact the USDA's TARGET Center at 202-720-2600 (voice or TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue SW, Washington, DC 20250-9410, or call 202-720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

Cover: Martin County Lake. The lake is in an area of the Hazleton-Shelocta-Fiveblock general soil map unit.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov.

Contents

Foreword

This soil survey contains information that affects land use planning in Lawrence and Martin Counties. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil maps. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

David G. Sawyer
State Conservationist
Natural Resources Conservation Service

Soil Survey of Lawrence and Martin Counties, Kentucky

By Steven J. Blanford and Alan K. Moore, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
Kentucky Natural Resources and Environmental Protection Cabinet and
Kentucky Agricultural Experiment Station

LAWRENCE AND MARTIN COUNTIES are located on the northeastern edge of the Eastern Kentucky Coal Fields Physiographic Region (fig. 1). They are part of the Big Sandy River Valley. These counties are bounded on the east by West Virginia. Lawrence County is bounded on the north by Boyd and Carter Counties, on the west by Elliott, Morgan, and Johnson Counties, and on the south by Martin County. Martin County is bounded on the north by Lawrence County, on the west by Johnson and Floyd Counties, and on the south by Pike County. Louisa is the county seat of Lawrence County, and Inez is the county seat of Martin County. Lawrence County has a land area of about 420 square miles, or 268,806 acres. Martin County has a land area of about 230 square miles, or 147,501 acres *(23)*. The populations of Lawrence and Martin Counties are about 13,998 and 12,526, respectively *(25)*. The projected county populations for the year 2000 are about 14,000 for Lawrence County and 13,000 for Martin County *(25)*.

The urban areas, rural developments, and farms of Lawrence and Martin Counties are located along stream terraces, along stream bottoms, in surface mine areas, and on ridges. The remainder of the land generally consists of wooded mountainous areas. Some areas, however, have been cleared for pasture or surface mined for coal.

Most of the acreage in Lawrence County is privately owned, but some small tracts are owned by coal-mining companies. In the northeastern part of the county, the United States Army Corps of Engineers owns approximately 18,750 acres along Blaine Creek and its major tributaries. Most of the acreage in Martin County is owned by coal-mining companies. The remainder of the county is divided into small tracts of privately owned woodland.

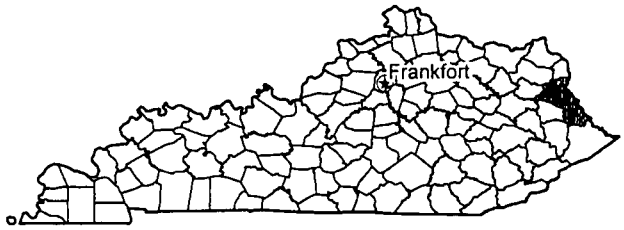


Figure 1.—Location of Lawrence and Martin Counties in Kentucky.

This soil survey supersedes the soils information for Lawrence and Martin Counties that was published in 1965 as part of the "Reconnaissance Soil Survey of Fourteen Counties in Eastern Kentucky" *(21)*. It provides additional and more detailed information.

General Nature of the Survey Area

This section gives general information concerning Lawrence and Martin Counties. It discusses history and development; geology, relief, and drainage; natural resources; farming; transportation; employment; and climate.

History and Development

In 1821, Lawrence County was formed from sections of Floyd and Greenup Counties by an act of the General Assembly of the Commonwealth of Kentucky *(13)*. It was the 69th county created in the

State. The county was named in honor of Captain James Lawrence (1781-1813), of the U.S. Navy, who participated in engagements against the Tripoli pirates in the Mediterranean and later fought the British in the War of 1812 *(13)*. Captain Lawrence is often quoted for his famous last words, "Don't give up the ship."

The county seat of Lawrence County, Louisa, was established in 1822 *(15)*. It is located at the confluence of the Tug and Levisa Forks of the Big Sandy River, which was a major trading port during pioneer days. It was first called Vancouver Fort until it was burned by the Indians in 1790, and it was also later named Balclutha in 1794 *(15)*.

In the 1880's, the U.S. Government built the first needle dam in the United States on the Big Sandy River at Louisa *(15)*. This dam allowed steamboats to operate on the river year-round and promoted trade in the county.

In 1882, the first railroad was built in Lawrence County, the Chateroy Railroad *(15)*. It passed through the City of Louisa. The railroad took over much of the steamboat trade in the area. It took coal from the area and transported it throughout the U.S. On return trips, the railroad brought much needed merchandise back to Lawrence County.

In 1870, Martin County was formed from sections of Floyd, Johnson, Pike, and Lawrence Counties by an act of the General Assembly of the Commonwealth of Kentucky *(13)*. It was the 116th county formed in the State. The county was named for Colonel John P. Martin (1811-1862), a popular State senator from Prestonsburg and the Lieutenant Governor in 1848 *(13)*.

The county seat of Martin County has been Inez since 1874 *(13)*. Warfield, on the eastern edge of Martin County, 10 miles from Inez, was the original county seat. Inez is located at the confluence of the two forks of Rockcastle Creek.

The first settler in Martin County was James Ward (1758-1848). Ward was a companion of Daniel Boone and a veteran of the Revolutionary War *(13)*. After the revolution, he accompanied General George Rogers Clark's expedition into Ohio on a punitive mission against Indians at Chillicothe and Piqua *(13)*. Moses Steep (1735-1855) is another of the early pioneers that settled in Martin County *(13)*. Although little is known about his early life, he is believed to have fought on the frontier of the Carolinas and Tennessee.

Geology, Relief, and Drainage

In Martin and Lawrence Counties, there is a south-to-north transition from steep slopes and high-crested ridges to lower, less steep and more rounded landforms. There are several reasons for this change in landscapes.

The geology of Martin County and southern Lawrence County is within the Pennsylvanian-age Breathitt Formation, except for a few of the tributaries of Blaine Creek where the underlying Lee Formation is exposed (see table 20). The Breathitt Formation consists of interbedded layers of sandstone, siltstone, shale, and coal beds of varying degrees of erodibility (fig. 2). Small areas of fossiliferous limestone also occur throughout the Breathitt Formation. The occurrence of these areas, however, cannot be predicted.

Elevations in this part of the survey area range from approximately 1,400 feet on the ridgetops to approximately 600 feet in the valley bottoms. The high ridges of this area are capped with the Upper Breathitt Formation, which contains significant amounts of sandstone. These sandstone beds provide protective caps that are highly resistant to weathering. The lower valley slopes are in the Lower Breathitt Formation, which is predominantly clayey shales, silty shales, and coal beds. Because these materials are more easily erodible, the streams in this area have cut as deeply as possible, relative to their gradient and controlling base level. The combination of the deep cutting and the resistant sandstone caps at the higher elevations has resulted in narrow valleys and steep side slopes.

The geology of northern Lawrence County is entirely within the Pennsylvanian-age Monogahela and Conemaugh Formations (see table 20). These formations consist of interbedded layers of siltstone, clayey shale, sandstone, and limestone. Any layer of these materials can be calcareous and contain secondary carbonates.

Elevations in this part of the survey area range from approximately 1,000 feet on the ridgetops to approximately 700 feet in the valley bottoms. The bedrock in this area is predominantly siltstone and clay shale. Because these materials are relatively soft and easily erodible, lower and more rounded hills with wider valleys occur.

The geology in the middle part of Lawrence County consists of a transition zone between the two previously described areas.

The Pennsylvanian-age Lee Formation is exposed in the following tributaries of Blaine Creek: Brushy Creek, Hood Creek, Lower Laurel Creek, Upper Laurel Creek, and the Spring Branch of the Left Fork of Blaine Creek (see table 20). The Lee Formation is a sandstone conglomerate with well rounded quartz pebbles (as much as ½ inch in diameter), and it appears to be erosion resistant. The resistance to

Figure 2.—Interbedded layers of sandstone, siltstone, shale, and coal beds that make up the Breathitt Formation.

erosion has retarded deep cutting of the valleys in this part of the Blaine Creek drainage basin. The uplands in this area are in a part of the Lower Breathitt Formation that is predominantly silty shales and fine-grained sandstone. The more easily erodible materials in the uplands and the resistant sandstone conglomerate in the valleys have enhanced the reduction and rounding of the hills in this region of the survey area.

The Walbridge and Warfield Fault Systems are located in Lawrence and Martin Counties, respectively. The Walbridge Fault System runs north and east from approximately 0.75 mile west of Blaine to the head of the See Branch of Lick Creek. The Warfield Fault System runs north and east from approximately 0.25 mile northwest of the confluence of Little Petercave Branch and Wolf Creek to approximately 0.25 mile north of the confluence of Wolf Creek and the Tug Fork of the Big Sandy River, at Lovely, Kentucky.

Lawrence and Martin Counties are dissected by a dendritic pattern of streams that empty north into the Big Sandy River. Young terrace deposits of Tertiary and Quaternary age and alluvial deposits of Quaternary age are scattered throughout the survey area (see table 20). The major streams in Martin County are the Coldwater, Middle, and Rockhouse Forks of Rockcastle Creek; Rockcastle Creek; Wolf Creek; and the Tug Fork of the Big Sandy River. The major streams in Lawrence County are the Dry and East Forks of the Little Sandy River, Blaine Creek, and the Levisa and Tug Forks of the Big Sandy River. The only major water impoundment in the survey area is Yatesville Lake, which is located in Lawrence County. It has approximately 2,240 surface acres of water at summer pool and was opened to the public in 1992.

Figure 3.—An area of Grigsby fine sandy loam, frequently flooded. Sand is deposited on flood plains during flood events.

Natural Resources

In addition to soil and water, the major natural resources in Lawrence and Martin Counties are coal, petroleum, natural gas, and trees.

Soil scientists have determined that there are about 25 major soils in the survey area. The soils range widely in color, texture, reaction, natural drainage, and other characteristics. Most of the soils on the steep mountain side slopes are deep and very deep, loamy soils which contain varying amounts of coarse fragments. Generally, the topsoil is dark and ranges from a few inches to as much as 8 inches or more in thickness. The subsoil ranges from red to yellow and from very strongly acid to alkaline. On the flood plains, soil particles and organic materials accumulate during repeating cycles of high and low stream flow events and overbank flows. Coarser textured soil particles settle out close to the streambanks while finer textured sediments are carried farther away from the steam and deposited closer to the adjacent side slopes (fig. 3). Based on their relative proximity to ground-water draining channels and nearby streams, these soils are variable in organic matter content and drainage.

Supplies of surface water are adequate to meet present needs and are available from local lakes, ponds, and rivers. Ground water is adequate to satisfy the needs of most rural homes in the survey area.

Coal is the most profitable mineral resource in Lawrence and Martin Counties, and numerous bituminous coal seams ranging from a few inches to several feet thick occur in the sedimentary rocks of the Pennsylvanian System. Coal has been

commercially mined in the area since the late 19th century. Most coal seams currently being mined are about 2 to 5 feet thick.

In 1992, about 56 miles yielded approximately 11,474,914 tons of coal *(10)*. About 27,295 tons were mined in Lawrence County, and about 11,447,619 tons were mined in Martin County. Of the total tonnage mined in each county, about 62 percent was from surface mines in Lawrence County and 38 percent was from mines in Martin County *(10)*.

Most of the coal is in the highly volatile bituminous groups A and B. This type of coal is especially suitable for metallurgical by-products of gas making, coke, ceramic products, cement and lime burning, foundry facing, and domestic trade.

Coal production has steadily increased in Lawrence and Martin Counties since 1961 because of several interrelated factors. As electrical power generation has increased and several coal-fired power plants have been built, new markets have been created. Long-term contracts for coal were developed that permitted long-term financing, resulting in long-life mechanical modern mine facilities. The supply of natural gas and petroleum is decreasing. The development of the unit train allows direct mine-to-plant hauling. These factors have made more production possible and have assured the continued use of coal as a competitive fuel while lowering the unit price of coal per man ton *(10)*.

Most mining has been contour mining, auger mining, mountaintop removal systems, and deep mining. Before the mining began, the land was generally used as woodland. After mining, most nearly level and gently sloping areas have been seeded with grasses and legumes and the steep outslopes have been planted with several varieties of trees and shrubs.

Oil and gas deposits were discovered mainly in the pre-Pennsylvanian rocks beneath the coal fields, and several small oil and gas fields are producing in the survey area.

Lawrence and Martin Counties are part of the Big Sandy Gas Field, and petroleum and natural gas wells are scattered throughout the counties. In 1990, oil production in these counties was about 50,000 barrels *(4)*. Most oil, however, is currently produced by secondary recovery methods, which result in low production. Two of the largest oil and gas fields in the survey area are the Martha and Mazie fields located in southwestern Lawrence County. They have been producing since the early 1900's *(40)*.

Second- and third-growth deciduous forests cover most of the land in Lawrence and Martin Counties. They are characterized by a variety of maples, yellow-poplar, beech, ash, and elm on the cool aspects and a mixture of oak and hickories on the warm aspects and ridgetops. Several varieties of pine trees are also on the more droughty sites. In the deeper ravines, hemlocks are also common. Some of the steeper slopes that were farmed in past years are now converted to woodland and support dominantly pure stands of yellow-poplar or beech. Several small sawmills are located throughout the survey area. They produce such products as rough lumber, dimension stock, railroad crossties, timers, and mine props.

Most of the original forest has been cleared along the stream bottoms, and these areas are now used for hay and pasture, burley tobacco, corn, and garden sites.

Farming

Although farming continues to be an important part of the economy of Lawrence County, it is of limited importance in Martin County. In 1987, Lawrence County had 388 farms while Martin County had only 25 *(9)*.

The principle crops in Lawrence and Martin Counties are burley tobacco, corn, and hay. Most of the corn is used for livestock feed and is not sold commercially. In 1992, the livestock included cattle, hogs, and chickens. In 1992, cash receipts from farming totaled $5,103 in Lawrence County and $1,266 in Martin County *(9)*.

Farming has declined in importance in most of Martin County and in the steeper parts of Lawrence County where many areas are too steep and rocky to farm. Most of the remaining farms are small and include steep wooded slopes as well.

Transportation

Highways, roads, and railroads generally follow the course of the major streams in the survey area. Major highways are U.S. Highway 23, Kentucky Highway 40, Kentucky Highway 645, Kentucky Highway 3, Kentucky Highway 1, Kentucky Highway 32, and Kentucky Highway 201 (fig. 4). The Norfolk and Western railroad system provides freight service to Martin County, and the C.S.X. system provides service to Lawrence County. Passenger train service is available at Williamson, West Virginia, and Ashland, Kentucky.

The nearest commercial airport is the Tri-State Airport, located in Huntington, West Virginia. Martin County has a new light aircraft airstrip stop that is atop a reclaimed surface mine on Kentucky Highway 3 on the Martin-Floyd-Pike County line. There is also

Figure 4.—Kentucky Highway 3 connects Martin County with Floyd and Johnson Counties. The road cut exposes the interbedded layers of sandstone, siltstone, shale, and coal beds of the Breathitt Geologic Formation.

a light aircraft airstrip in Johnson County on U.S. Highway 23.

Employment

Most Martin County residents are employed in the mining industry. Most Lawrence County residents are employed in county or near-by industrial plants. Several people are part-time farmers and either work for, or are retired from, one of the local industries. A few Lawrence County residents are full-time farmers. The majority of non-mine and non-industrial employees work in wholesale and retail trade, transportation and communication, construction, government services, and service-related businesses.

Climate

Tables 1A, 1B, 2, and 3 give data on climate for the survey area as recorded in the period 1965 to 1986. Tables 1A and 1B give data on temperature and precipitation for the survey area as recorded at Louisa and Tomahawk, Kentucky. (In Lawrence County, precipitation data was recorded at Louisa and temperature data was recorded at Tomahawk.) Table 2 shows probable dates of the first freeze in fall and the last freeze in spring as recorded at Tomahawk. Table 3 provides data on length of the growing season as recorded at Tomahawk.

In winter, the average temperature is 32.4 degrees F and the average daily minimum temperature is 19.7 degrees. The lowest temperature on record, which occurred at Tomahawk on January 21, 1985, is -18 degrees. In summer, the average temperature is 71.6 degrees and the average daily maximum temperature is 85.0 degrees. The highest recorded temperature, which occurred at Tomahawk on August 21, 1993, is 102 degrees.

Growing degree days are shown in tables 1A and 1B. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule

single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 42.44 inches. Of this, 23.47 inches, or about 55 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall on record was 4.34 inches, recorded at Louisa on June 22, 1953. Thunderstorms occur on about 42 days each year, and most occur in July.

The average seasonal snowfall is 16.7 inches. The greatest snow depth at any one time during the period of record was 20 inches, recorded on January 20, 1978. On the average, 8 days of the year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 10.0 inches, recorded on January 20, 1978.

The average relative humidity in midafternoon is about 58 percent. Humidity is higher at night, and the average at dawn is about 83 percent. The sun shines 63 percent of the time possible in summer and 43 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 8.1 miles per hour, in March.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries *(22)*.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research *(19)*.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are

predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil lines on the general soil maps for this survey area match those of the adjoining counties. The soil names, however, do not always correspond. The differences are due to the relative proportions of the soils in the counties and to refinements in the classification of the soils.

Most soil lines on the detailed soil maps match those of adjoining counties; a few do not join. Differences are due to surface mining activities that affect the kind of soils mapped, refinements or modifications of the map units, and differences in the scale of the photographic base used to plot the soil lines. In most places, the soil names do not fully agree. These differences are the result of improved placement of the soils in the soil classification system. Most of these improvements resulted from laboratory analysis of the soils.

Survey Procedures

The general procedures followed in making this survey are described in the "National Soils Handbook" and the "Soil Survey Manual" of the Natural Resources Conservation Service *(22)*. The "Reconnaissance Soil Survey of Fourteen Counties in Eastern Kentucky" *(21)* and other soil surveys adjacent to Lawrence and Martin Counties were used as references.

Boundaries of slopes and landforms were plotted stereoscopically on quad-centered aerial photographs taken in 1988, 1990, and 1991 at a scale of 1:24,000. Map units were then designed according to the pattern of soils interpreted from aerial photographs, field observations, and United States Geological Survey geologic and topographic maps *(26 through 47)*.

Two levels of mapping intensity were used in this survey. More closely spaced observations were made in the valleys where the soils are used for agriculture or urban development. Less closely spaced observations were made in the mountainous areas where the soils are used as woodland and wildlife habitat or are being mined for coal. For either level of mapping intensity, the information about the soils can be used to determine soil management and to predict the suitability of the soils for various uses.

Traverses in the valleys were made by truck or on foot. The soils were examined at intervals ranging from a few hundred feet to about 1/4 mile, depending on the landscape and soil pattern. Observations of special features, such as landforms, vegetation, and evidence of flooding, were made continuously without regard to spacing. Soil boundaries were determined on the basis of soil examinations, observations, and photo interpretation. In many areas, such as those where very steep slopes intersect with flood plains, these boundaries are precise because of an abrupt change in the landform. The soils were examined with the aid of a hand probe, hydraulic soil probe, a bucket auger, or a spade to a depth of about 3 to 7 feet. The typical pedons were observed in pits dug by hand. Additional soils descriptions were obtained through statistical sampling techniques.

Traverses in the mountainous areas were made by truck or on foot along the existing network of roads and trails. These traverses commonly were made a few miles apart where the geologic materials and landscapes were uniform. In areas where differences in geologic material or landscapes were observed, traverses were made at intervals close enough for the soil scientists to observe any differences among the soils. Examinations were made at intervals ranging from a few hundred feet to about 1/4 mile. Observations of landforms and vegetation were made continuously without regard to spacing. Where soil profiles were readily observable, such as along recently constructed mining access roads, along highwalls, and along logging roads, observations of the content of rock fragments, depth to bedrock, depth of rooting, the landform, and the underlying material were also made without regard to spacing. Soil boundaries were plotted stereoscopically on the basis of parent material, landform, and relief. Many of these boundaries cannot be exact because they fall within a zone of gradual change between landforms, such as an area where a mountain crest becomes a mountainside. Much intermingling of the soils occurs in these zones. Soil descriptions were obtained through statistical sampling techniques.

Samples for chemical and physical analyses were taken from the site of the typical pedon of the major soils in the survey area. Most of the analyses were

made by the Kentucky Agricultural Experiment Station. Commonly used laboratory procedures were followed *(17)*.

After completion of the soil mapping on quad-centered aerial photographs, map unit delineations were transferred by hand to orthophotographs at a scale of 1:24,000. Surface drainage and cultural features were transferred from 7.5-minute topographic maps.

General Soil Map Units

The general soil maps show broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil maps is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil maps can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the maps. Likewise, areas where the soils are not suitable can be identified.

Because of the small scale, the maps are not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Lawrence County

1. Hazleton-Shelocta-Fiveblock

Very deep and deep, nearly level to very steep, well drained and somewhat excessively drained, loamy soils; on mountains (fig. 5)

Setting

Landform: Mountains
Slope range: 0 to 80 percent

Extent and Composition

Percent of Lawrence County: 19
Extent of the soils in the general soil map unit:
Hazleton and similar soils—30 percent
Shelocta and similar soils—20 percent
Fiveblock and similar soils—20 percent
Minor components—30 percent

Minor Contrasting Components

- Dekalb, Marrowbone, and Rayne soils on steep and very steep ridgetops, commonly associated with rock outcrops
- Cloverlick and Fedscreek soils on side slopes
- Allegheny and Cotaco soils on stream terraces
- Grigsby, Nelse, and Orrville soils on flood plains
- Fairpoint and Kaymine soils in nearly level to very steep surface mined areas
- Udorthents and urban land along major highways and stream terraces

Soil Properties and Qualities

Hazleton
Depth class: Very deep
Drainage class: Well drained
Natural fertility: Low
Organic matter content: Moderate
Permeability: Moderately rapid or rapid
Available water capacity: Low or moderate
Depth of root zone: Very deep
Surface runoff: Medium
Depth to water table: More than 6 feet
Flooding: None

Shelocta
Depth class: Deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: Low to high
Permeability: Moderate
Available water capacity: Moderate
Depth of root zone: Deep
Surface runoff: Medium or rapid
Depth to water table: More than 6 feet
Flooding: None

Fiveblock
Depth class: Very deep
Drainage class: Somewhat excessively drained
Natural fertility: Low
Organic matter content: Low
Permeability: Moderately rapid or rapid
Available water capacity: Low or moderate
Depth of root zone: Very deep
Surface runoff: Slow or medium
Depth to water table: More than 6 feet
Flooding: None

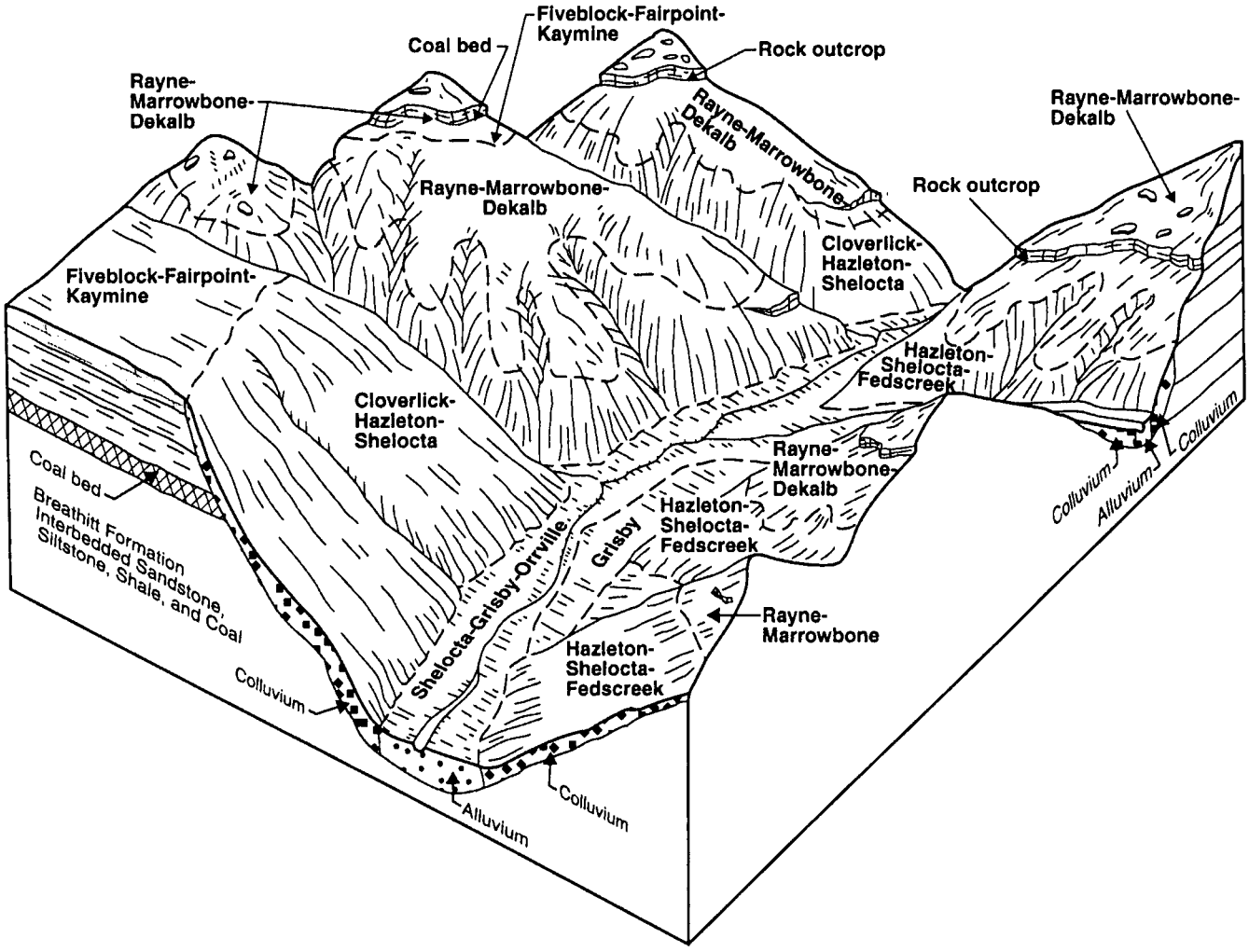


Figure 5.—Typical pattern of soils, parent material, and topography in the Hazleton-Shelocta-Fiveblock and Grigsby-Shelocta-Orrville general soil map units. The Hazleton-Shelocta-Fiveblock general soil map unit is on the mountains and in the surface mined areas, and the Grigsby-Shelocta-Orrville general soil map unit is in the valleys.

Use and Management

Cropland
- These soils are not suited to row crop production.
- The slope, the hazard of erosion, surface stones, and rock outcrops are the main limitations.

Pasture and hayland
- These soils are poorly suited to hayland and pasture.
- The slope, the hazard of erosion, surface stones, and rock outcrops are the main limitations.
- Several areas adjacent to the stream valleys have been cleared and are used as unimproved pasture.

Woodland
- These soils are used mainly for woodland production and are presently in second-growth hardwoods.

Wildlife habitat
- These soils are suited to woodland wildlife habitat.

Urban development
- These soils are not suited to urban uses.
- The slope is the main limitation.

2. Udorthents-Grigsby-Shelocta

Very deep and deep, nearly level to sloping, well drained, loamy soils; on flood plains and footslopes

Setting

Landform: Flood plains and footslopes
Slope range: 0 to 15 percent

Extent and Composition

Percent of Lawrence County: 1
Extent of the soils in the general soil map unit:
Udorthents and similar soils—70 percent
Grigsby and similar soils—15 percent
Shelocta and similar soils—10 percent
Minor components—5 percent

Minor Contrasting Components

- Dekalb, Marrowbone, and Rayne soils on steep and very steep ridgetops, commonly associated with rock outcrops
- Cloverlick, Fedscreek, and Hazleton soils on side slopes
- Allegheny and Cotaco soils and urban land on stream terraces
- Nelse and Orrville soils on flood plains
- Fairpoint, Fiveblock, and Kaymine soils in nearly level to very steep surface mined areas

Soil Properties and Qualities

Udorthents
Depth class: Variable
Drainage class: Variable
Natural fertility: Variable
Organic matter content: Variable
Permeability: Variable
Available water capacity: Variable
Depth of root zone: Variable
Surface runoff: Variable
Depth to water table: Variable
Flooding: Variable

Grigsby
Depth class: Very deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: Low or moderate
Permeability: Moderate or moderately rapid
Available water capacity: Moderate
Depth of root zone: Very deep
Surface runoff: Slow
Water table (depth, months): 3.5 to 6 feet; January through April
Flooding (frequency, months): Frequent; December through May

Shelocta
Depth class: Deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: Low to high
Permeability: Moderate
Available water capacity: Moderate
Depth of root zone: Deep
Surface runoff: Medium or rapid
Depth to water table: More than 6 feet
Flooding: None

Use and Management

Cropland
- These soils are suited to row crop production.
- The slope, erosion hazard, and frequent flooding are the main limitations.

Pasture and hayland
- These soils are suited to hayland and pasture.
- The frequent flooding, slope, and erosion hazard are the main limitations.

Woodland
- These soils are suited to woodland production and are presently in second-growth hardwoods.

Wildlife habitat
- These soils are suited to openland wildlife habitat.

Urban development
- These soils are suited to urban uses.
- The frequent flooding and the slope are the main limitations.

3. Udorthents-Nelse-Allegheny

Very deep, nearly level to very steep, well drained, loamy soils; on flood plains and stream terraces (fig. 6)

Setting

Landform: Flood plains and stream terraces
Slope range: 0 to 80 percent

Extent and Composition

Percent of Lawrence County: 3
Extent of the soils in the general soil map unit:
Udorthents and similar soils—40 percent
Nelse and similar soils—25 percent
Allegheny and similar soils—15 percent
Minor components—20 percent

Minor Contrasting Components

- Blairton, Cruze, Dekalb, Marrowbone, and Rayne soils on sloping to very steep ridgetops, commonly associated with rock outcrops
- Cloverlick, Fedscreek, Hazleton, and Shelocta soils on side slopes and colluvial fans
- Cotaco soils and urban land on stream terraces

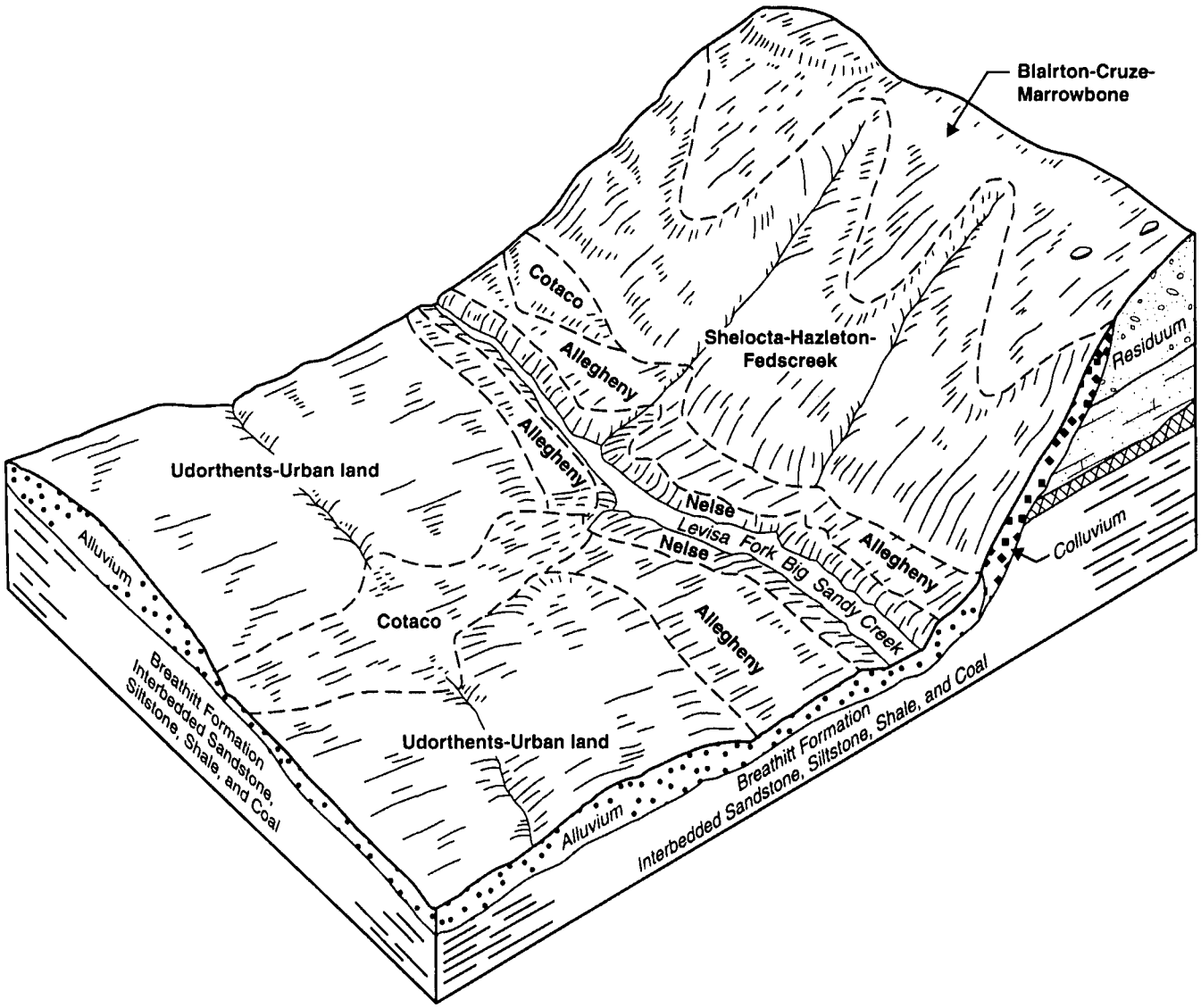


Figure 6.—Typical pattern of soils, parent material, and topography in the Udorthents-Nelse-Allegheny and Shelocta-Hazleton-Blairton general soil map units. The Udorthents-Nelse-Allegheny general soil map unit is along the Tug and Levista Forks of the Big Sandy River and their major tributaries, and the Shelocta-Hazleton-Blairton general soil map unit is on the mountains.

- Grigsby and Orrville soils on flood plains
- Fairpoint, Fiveblock, and Kaymine soils in nearly level to very steep surface mined areas

Soil Properties and Qualities

Udorthents

Depth class: Variable
Drainage class: Variable
Natural fertility: Variable
Organic matter content: Variable
Permeability: Variable
Available water capacity: Variable
Depth of root zone: Variable
Surface runoff: Variable
Depth to water table: Variable
Flooding: Variable

Nelse

Depth class: Very deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: High
Permeability: Moderately rapid or rapid
Available water capacity: Low
Depth of root zone: Very deep

Surface runoff: Slow or medium
Water table (depth, months): 4 to 6 feet; February through March
Flooding (frequency, months): Frequent; January through December

Allegheny
Depth class: Very deep
Drainage class: Well drained
Natural fertility: High
Organic matter content: Low or moderate
Permeability: Moderate
Available water capacity: High
Depth of root zone: Very deep
Surface runoff: Slow or medium
Depth to water table: More than 6 feet
Flooding (freqency, months): Occasional; November through April

Use and Management

Cropland
- These soils are not suited to row crop production.
- Areas of the Allegheny soils on stream terraces that are not flooded during the growing season are used for row crop production.

Pasture and hayland
- These soils are suited to hayland and pasture.
- The frequent flooding, slope, and erosion hazard are the main limitations.

Woodland
- These soils are suited to woodland production and are presently in second-growth hardwoods.

Wildlife habitat
- These soils are suited to openland wildlife habitat.

Urban development
- These soils are suited to urban uses.
- The frequent flooding and the slope are the main limitations.

4. Grigsby-Shelocta-Orrville

Very deep and deep, nearly level to sloping, somewhat poorly drained and well drained, loamy soils; on flood plains and footslopes (fig. 5)

Setting

Landform: Flood plains and footslopes
Slope range: 0 to 15 percent

Extent and Composition

Percent of Lawrence County: 7

Extent of the soils in the general soil map unit:
Grigsby and similar soils—35 percent
Shelocta and similar soils—20 percent
Orrville and similar soils—10 percent
Minor components—35 percent

Minor Contrasting Components

- Blairton, Cruze, Dekalb, Marrowbone, and Rayne soils on sloping to very steep ridgetops, commonly associated with rock outcrops
- Beech, Cloverlick, Fedscreek, Hazleton, and Vandalia soils on side slopes
- Allegheny and Cotaco soils on stream terraces
- Chagrin, Holly, and Nelse soils on flood plains
- Fairpoint, Fiveblock, and Kaymine soils in nearly level to very steep surface mined areas
- Udorthents and urban land along major highways and stream terraces

Soil Properties and Qualities

Grigsby
Depth class: Very deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: Low or moderate
Permeability: Moderate or moderately rapid
Available water capacity: Moderate or high
Depth of root zone: Very deep
Surface runoff: Slow
Water table (depth, months): 3.5 to 6 feet; January through April
Flooding (frequency, months): Frequent; December through May

Shelocta
Depth class: Deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: Low to high
Permeability: Moderate
Available water capacity: Moderate
Depth of root zone: Deep
Surface runoff: Medium or rapid
Depth to water table: More than 6 feet
Flooding: None

Orrville
Depth class: Very deep
Drainage class: Somewhat poorly drained
Natural fertility: Medium
Organic matter content: Moderate
Permeability: Moderate or moderately rapid
Available water capacity: Moderate or high
Depth of root zone: Very deep
Surface runoff: Slow

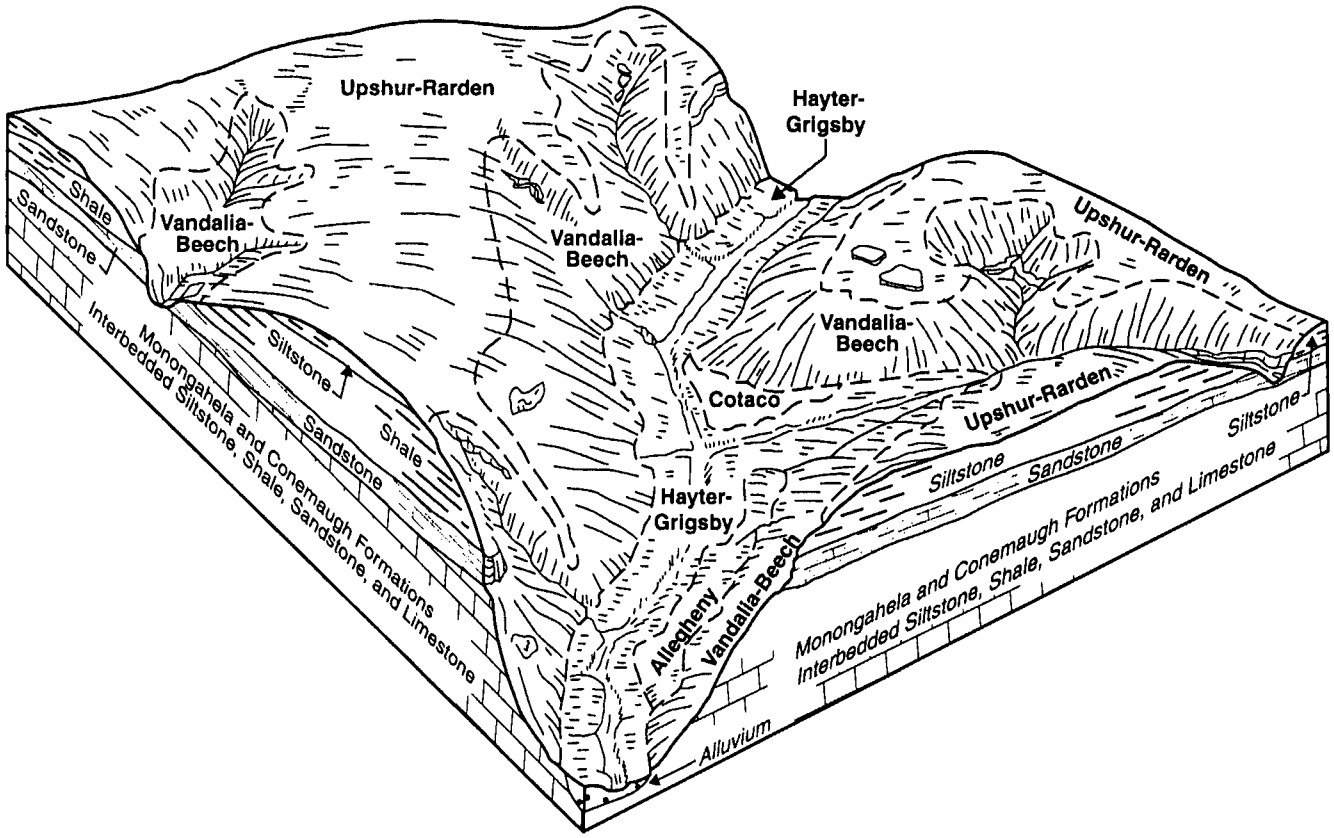


Figure 7.—Typical pattern of soils, parent material, and topography in the Upshur-Vandalia-Rarden general soil map unit. This map unit is on the mountains.

Water table (depth, months): 1 to 2.5 feet; November through June
Flooding (frequency, months): Frequent; November through May

Use and Management

Cropland
- These soils are suited to row crop production.
- The slope, seasonal high water table, erosion hazard, and frequent flooding are the main limitations.

Pasture and hayland
- These soils are suited to hayland and pasture.
- The frequent flooding, slope, and erosion hazard are the main limitations.

Woodland
- These soils are suited to woodland production and are presently in second-growth hardwoods.

Wildlife habitat
- These soils are suited to openland wildlife habitat.

Urban development
- These soils are suited to urban uses.
- The frequent flooding, seasonal high water table, and slope are the main limitations.

5. Upshur-Vandalia-Rarden

Very deep, deep, and moderately deep, sloping to very steep, moderately well drained and well drained, loamy soils; on mountains (fig. 7)

Setting

Landform: Mountains
Slope range: 6 to 60 percent

Extent and Composition

Percent of Lawrence County: 24
Extent of the soils in the general soil map unit:
Upshur and similar soils—25 percent
Vandalia and similar soils—15 percent
Rarden and similar soils—15 percent
Minor components—45 percent

Minor Contrasting Components

- Dekalb, Marrowbone, and Rayne soils on steep and

very steep ridgetops, commonly associated with rock outcrops
- Beech, Fedscreek, Hazleton, and Shelocta soils on side slopes
- Hayter soils on colluvial fans and stream terraces
- Allegheny and Cotaco soils on stream terraces
- Chagrin, Grigsby, Holly, and Orrville soils on flood plains
- Udorthents and urban land along major highways and stream terraces

Soil Properties and Qualities

Upshur
Depth class: Deep
Drainage class: Well drained
Natural fertility: High
Organic matter content: Low or moderate
Permeability: Slow
Available water capacity: Low or moderate
Depth of root zone: Deep
Surface runoff: Medium or rapid
Depth to water table: More than 6 feet
Flooding: None

Vandalia
Depth class: Very deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: Low or moderate
Permeability: Slow or moderate
Available water capacity: Moderate
Depth of root zone: Very deep
Surface runoff: Medium or rapid
Water table (depth, months): 4 to 6 feet; February through April
Flooding: None

Rarden
Depth class: Moderately deep
Drainage class: Moderately well drained
Natural fertility: High
Organic matter content: Low or moderate
Permeability: Slow
Available water capacity: Low
Depth of root zone: Moderately deep
Surface runoff: Medium to very rapid
Water table (depth, months): 1.5 to 3 feet; January through April
Flooding: None

Use and Management

Cropland
- These soils are not suited to row crop production.
- The slope, the hazard of erosion, surface stones, and rock outcrops are the main limitations.
- Several areas located on the sloping ridgetops are used for the production of corn and tobacco.

Pasture and hayland
- These soils are poorly suited to hayland and pasture.
- The slope, the hazard of erosion, surface stones, and rock outcrops are the main limitations.
- Several areas adjacent to the stream valleys and on sloping ridgetops have been cleared and are used as unimproved pasture.

Woodland
- These soils are used mainly for woodland production and are presently in second-growth hardwoods.

Wildlife habitat
- These soils are suited to woodland wildlife habitat.

Urban development
- These soils are not suited to urban uses.
- The slope, a seasonal high water table, and a high shrink-swell potential are the main limitations.

6. Shelocta-Hazleton-Blairton

Very deep, deep, and moderately deep, sloping to very steep, moderately well drained and well drained, loamy soils; on mountains (fig. 6)

Setting

Landform: Mountains
Slope range: 6 to 60 percent

Extent and Composition

Percent of Lawrence County: 46
Extent of the soils in the general soil map unit:
Shelocta and similar soils—35 percent
Hazleton and similar soils—15 percent
Blairton and similar soils—10 percent
Minor components—40 percent

Minor Contrasting Components

- Cruze, Dekalb, Marrowbone, and Rayne soils on sloping to very steep ridgetops, commonly associated with rock outcrops
- Beech, Cloverlick, Fedscreek, and Vandalia soils on side slopes
- Allegheny and Cotaco soils on stream terraces
- Chagrin, Grigsby, Holly, Nelse, and Orrville soils on flood plains
- Fairpoint, Fiveblock, and Kaymine soils on contour benches formed by surface mining

- Udorthents and urban land along major highways and stream terraces

Soil Properties and Qualities

Shelocta
Depth class: Deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: Low to high
Permeability: Moderate
Available water capacity: Moderate
Depth of root zone: Deep
Surface runoff: Medium or rapid
Depth to water table: More than 6 feet
Flooding: None

Hazleton
Depth class: Very deep
Drainage class: Well drained
Natural fertility: Low
Organic matter content: Moderate
Permeability: Moderately rapid or rapid
Available water capacity: Low or moderate
Depth of root zone: Very deep
Surface runoff: Medium
Depth to water table: More than 6 feet
Flooding: None

Blairton
Depth class: Moderately deep
Drainage class: Moderately well drained
Natural fertility: Medium
Organic matter content: Low or moderate
Permeability: Moderately slow
Available water capacity: Low
Depth of root zone: Moderately deep
Surface runoff: Medium to very rapid
Water table (depth, months): 2 to 3.5 feet; November through March
Flooding: None

Use and Management

Cropland
- These soils are not suited to row crop production.
- The slope, the hazard of erosion, surface stones, and rock outcrops are the main limitations.

Pasture and hayland
- These soils are poorly suited to hayland and pasture.
- The slope, the hazard of erosion, surface stones, and rock outcrops are the main limitations.
- Several areas adjacent to the stream valleys and on sloping ridgetops have been cleared and are used as unimproved pasture.

Woodland
- These soils are used mainly for woodland production and are presently in second-growth hardwoods.

Wildlife habitat
- These soils are suited to woodland wildlife habitat.

Urban development
- These soils are not suited to urban uses.
- The slope and a seasonal high water table are the main limitations.

Martin County

1. Hazleton-Shelocta-Fiveblock

Very deep and deep, nearly level to very steep, well drained and somewhat excessively drained, loamy soils; on mountains (fig. 5)

Setting

Landform: Mountains
Slope range: 0 to 80 percent

Extent and Composition

Percent of Martin County: 96
Extent of the soils in the general soil map unit:
Hazleton and similar soils—30 percent
Shelocta and similar soils—20 percent
Fiveblock and similar soils—20 percent
Minor components—30 percent

Minor Contrasting Components

- Dekalb, Marrowbone, and Rayne soils on steep and very steep ridgetops, commonly associated with rock outcrops
- Cloverlick and Fedscreek soils on side slopes
- Allegheny and Cotaco soils on stream terraces
- Grigsby, Nelse, and Orrville soils on flood plains
- Fairpoint and Kaymine soils in nearly level to very steep surface mined areas
- Udorthents and urban land along major highways and stream terraces

Soil Properties and Qualities

Hazleton
Depth class: Very deep
Drainage class: Well drained
Natural fertility: Low
Organic matter content: Moderate
Permeability: Moderately rapid or rapid
Available water capacity: Low or moderate

Depth of root zone: Very deep
Surface runoff: Medium
Depth to water table: More than 6 feet
Flooding: None

Shelocta
Depth class: Deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: Low to high
Permeability: Moderate
Available water capacity: Moderate
Depth of root zone: Deep
Surface runoff: Medium or rapid
Depth to water table: More than 6 feet
Flooding: None

Fiveblock
Depth class: Very deep
Drainage class: Somewhat excessively drained
Natural fertility: Low
Organic matter content: Low
Permeability: Moderately rapid or rapid
Available water capacity: Low or moderate
Depth of root zone: Very deep
Surface runoff: Slow or medium
Depth to water table: More than 6 feet
Flooding: None

Use and Management

Cropland
- These soils are not suited to row crop production.
- The slope, the hazard of erosion, surface stones, and rock outcrops are the main limitations.

Pasture and hayland
- These soils are poorly suited to hayland and pasture.
- The slope, the hazard of erosion, surface stones, and rock outcrops are the main limitations.
- Several areas adjacent to the stream valleys have been cleared and are used as unimproved pasture.

Woodland
- These soils are used mainly for woodland production and are presently in second-growth hardwoods.

Wildlife habitat
- These soils are suited to woodland wildlife habitat.

Urban development
- These soils are not suited to urban uses.
- The slope is the main limitation.

2. Udorthents-Grigsby-Shelocta

Very deep and deep, nearly level to sloping, well drained, loamy soils; on flood plains and footslopes

Setting

Landform: Flood plains and footslopes
Slope range: 0 to 15 percent

Extent and Composition

Percent of Martin County: 3
Extent of the soils in the general soil map unit:
Udorthents and similar soils—70 percent
Grigsby and similar soils—15 percent
Shelocta and similar soils—10 percent
Minor components—5 percent

Minor Contrasting Components

- Dekalb, Marrowbone, and Rayne soils on steep and very steep ridgetops, commonly associated with rock outcrops
- Cloverlick, Fedscreek, and Hazleton soils on side slopes
- Allegheny and Cotaco soils and urban land on stream terraces
- Nelse and Orrville soils on flood plains
- Fairpoint, Fiveblock, and Kaymine soils in nearly level to very steep surface mined areas

Soil Properties and Qualities

Udorthents
Depth class: Variable
Drainage class: Variable
Natural fertility: Variable
Organic matter content: Variable
Permeability: Variable
Available water capacity: Variable
Depth of root zone: Variable
Surface runoff: Variable
Depth to water table: Variable
Flooding: Variable

Grigsby
Depth class: Very deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: Low or moderate
Permeability: Moderate or moderately rapid
Available water capacity: Moderate
Depth of root zone: Very deep
Surface runoff: Slow
Water table (depth, months): 3.5 to 6 feet; January through April
Flooding (frequency, months): Frequent; December through May

Shelocta
Depth class: Deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: Low to high
Permeability: Moderate
Available water capacity: Moderate
Depth of root zone: Deep
Surface runoff: Medium or rapid
Depth to water table: More than 6 feet
Flooding: None

Use and Management

Cropland
- These soils are suited to row crop production.
- The slope, erosion hazard, and frequent flooding are the main limitations.

Pasture and hayland
- These soils are suited to hayland and pasture.
- The frequent flooding, slope, and erosion hazard are the main limitations.

Woodland
- These soils are suited to woodland production and are presently in second-growth hardwoods.

Wildlife habitat
- These soils are suited to openland wildlife habitat.

Urban development
- These soils are suited to urban uses.
- The frequent flooding and the slope are the main limitations.

3. Udorthents-Nelse-Allegheny

Very deep, nearly level to very steep, well drained, loamy soils; on flood plains and stream terraces (fig. 6)

Setting

Landform: Flood plains and stream terraces
Slope range: 0 to 80 percent

Extent and Composition

Percent of Martin County: 1
Extent of the soils in the general soil map unit:
Udorthents and similar soils—65 percent
Nelse and similar soils—25 percent
Allegheny and similar soils—5 percent
Minor components—5 percent

Minor Contrasting Components

- Dekalb, Marrowbone, and Rayne soils on steep and very steep ridgetops, commonly associated with rock outcrops
- Cloverlick, Fedscreek, Hazleton, and Shelocta soils on side slopes and colluvial fans
- Cotaco soils and urban land on stream terraces
- Grigsby and Orrville soils on flood plains
- Fairpoint, Fiveblock, and Kaymine soils in nearly level to very steep surface mined areas

Soil Properties and Qualities

Udorthents
Depth class: Variable
Drainage class: Variable
Natural fertility: Variable
Organic matter content: Variable
Permeability: Variable
Available water capacity: Variable
Depth of root zone: Variable
Surface runoff: Variable
Depth to water table: Variable
Flooding: Variable

Nelse
Depth class: Very deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: High
Permeability: Moderately rapid or rapid
Available water capacity: Low
Depth of root zone: Very deep
Surface runoff: Slow or medium
Water table (depth, months): 4 to 6 feet; February through March
Flooding (frequency, months): Frequent; January through December

Allegheny
Depth class: Very deep
Drainage class: Well drained
Natural fertility: High
Organic matter content: Low or moderate
Permeability: Moderate
Available water capacity: High
Depth of root zone: Very deep
Surface runoff: Slow or medium
Depth to water table: More than 6 feet
Flooding (frequency, months): Occasional; November through April

Use and Management

Cropland
- These soils are not suited to row crop production.
- Areas of the Allegheny soils on stream terraces that are not flooded during the growing season are used for row crop production.

Pasture and hayland
- These soils are suited to hayland and pasture.
- The frequent flooding, slope, and erosion hazard are the main limitations.

Woodland
- These soils are suited to woodland production and are presently in second-growth hardwoods.

Wildlife habitat
- These soils are suited to openland wildlife habitat.

Urban development
- These soils are suited to urban uses.
- The frequent flooding and the slope are the main limitations.

Detailed Soil Map Units

The map units delineated on the detailed soil maps represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils are rated as to their suitability for different uses. The suitability ratings are well suited, suited, poorly suited, and not suited. Soils rated *well suited* have favorable properties for the specified use, and limitations are easy to overcome. Good performance and low maintenance can be expected. Soils rated *suited* have moderately favorably properties for the selected use. One or more properties make these soils less desirable that those rated well suited. Soils rated *poorly suited* have one or more properties that are unfavorable for the selected use. Overcoming the limitations requires special designs, extra maintenance, or costly operation. Soils rated *not suited* cannot meet the expected performance for the selected use, or they require extreme measures to overcome the undesirable features.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example,

Allegheny loam, 2 to 6 percent slopes, rarely flooded, is a phase of the Allegheny series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Hayter-Grigsby complex, 2 to 15 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Fiveblock, Fairpoint, and Kaymine soils, 0 to 6 percent slopes, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. Dumps, mine; tailings; and tipples, is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

AaB—Allegheny loam, 2 to 6 percent slopes

Setting

Landform: River and stream terraces
Shape of areas: Irregular
Size of areas: 5 to 15 acres

Composition

Allegheny soil and similar soils: 90 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Cotaco soils, soils that have a dark surface layer, and coarse-loamy soils in landform positions similar to those of the Allengheny soil
- Hayter soils on stream terraces and colluvial fans
- Chagrin, Grigsby, Holly, and Orrville soils on flood plains
- Nelse soils on banks of major streams and rivers

Typical Profile

Surface layer:
0 to 8 inches—brown loam

Subsoil:
8 to 21 inches—yellowish brown silt loam
21 to 33 inches—dark yellowish brown silt loam
33 to 52 inches—dark yellowish brown loam

Substratum:
52 to 65 inches—yellowish brown sandy loam
65 to 89 inches—light yellowish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Natural fertility: High
Organic matter content: Low or moderate
Permeability: Moderate
Available water capacity: High
Depth to root zone: Very deep
Surface runoff: Slow or medium
Depth to water table: More than 6 feet
Flooding: None

Use and Management

Cropland

- Most areas of this soil are suited to the production of row crops, such as corn, tobacco, and garden plots.
- Soil management concerns include keeping erosion to a minimum and maintaining tilth and fertility.
- Conservation tillage, establishing and maintaining grass waterways within areas of concentrated water-flow patterns, contour farming, and managing crop residue can be used to reduce the hazard of erosion.
- Conservation tillage, the use of cover crops, and applications of lime and fertilizer help to maintain soil tilth and fertility and prevent erosion.

Pasture and hayland

- Most areas of this soil are used for the production of pasture and hay.
- This soil is well suited to hay and pasture.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and

adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- This soil is suited to woodland production, and yields are generally high.
- Shortleaf pine, yellow-poplar, Virginia pine, sugar maple, white ash, northern red oak, American elm, red maple, pignut hickory, black oak, white oak, eastern redcedar, and black cherry are some of the native trees.
- Some trees preferred for planting on this soil are eastern white pine, yellow-poplar, black walnut, shortleaf pine, white oak, white ash, and northern red oak.
- See table 7 for specific information relating to the potential productivity of this soil.
- The main concern in managing timber is plant competition.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for openland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Field borders are good wildlife areas.
- Trees and brush along streams are beneficial to wildlife and help to control erosion.
- Brush piles or other nesting sites are needed.

Urban development
- This soil is well suited to most urban uses.

Interpretive Group

Land capability classification: IIe

AaC—Allegheny loam, 6 to 15 percent slopes

Setting

Landform: River and stream terraces
Shape of areas: Irregular
Size of areas: 5 to 15 acres

Composition

Allegheny soil and similar soils: 85 percent
Contrasting components of minor extent: 15 percent

Minor Contrasting Components

- Cotaco soils, soils that have a dark surface layer, and coarse-loamy soils in landform positions similar to those of the Allegheny soil
- Hayter soils on stream terraces and colluvial fans
- Chagrin, Grigsby, Holly, and Orrville soils on flood plains
- Nelse soils on banks of major streams and rivers

Typical Profile

Surface layer:
0 to 8 inches—brown loam

Subsoil:
8 to 21 inches—yellowish brown silt loam
21 to 33 inches—dark yellowish brown silt loam
33 to 52 inches—dark yellowish brown loam

Substratum:
52 to 65 inches—yellowish brown sandy loam
65 to 89 inches—light yellowish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: Low or moderate
Permeability: Moderate
Available water capacity: High
Depth to root zone: Very deep
Surface runoff: Medium
Depth to water table: More than 6 feet
Flooding: None

Use and Management

Cropland
- Most areas of this soil are suited to the production of row crops, such as corn, tobacco, and garden plots.
- The slope and erosion hazard are management concerns in the steeper areas of the stream terraces and alluvial fans.
- Conservation tillage, establishing and maintaining grass waterways within areas of concentrated water-flow patterns, contour farming, and crop residue management can be used to reduce the hazard of erosion.
- Conservation tillage, the use of cover crops, and applications of lime and fertilizer help to maintain soil tilth and fertility and prevent erosion.

Pasture and hayland
- Most areas of this soil are used for the production of pasture and hay.
- This soil is well suited to hay and pasture, but the slope and erosion hazard may limit hay and forage production.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.

- Proper species selection, proper seedbed preparation, the use of good-quality seed, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- This soil is suited to woodland production, and yields are generally high.
- Shortleaf pine, yellow-poplar, Virginia pine, sugar maple, white ash, northern red oak, American elm, red maple, pignut hickory, black oak, white oak, eastern redcedar, and black cherry are some of the native trees.
- Some trees preferred for planting on this soil are eastern white pine, yellow-poplar, black walnut, shortleaf pine, white oak, white ash, and northern red oak.
- See table 7 for specific information relating to the potential productivity of this soil.
- The main concern in managing timber is plant competition.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for openland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Field borders are good wildlife areas.
- Trees and brush along streams are beneficial to wildlife and help to control erosion.
- Brush piles or other nesting sites are needed.

Urban development
- This soil is suited to most urban uses.
- The slope is the main limitation.
- The slope may be overcome by sound engineering practices.

Interpretive Group

Land capability classification: IIIe

AbB—Allegheny loam, 2 to 6 percent slopes, rarely flooded

Setting

Landform: River and stream terraces
Shape of areas: Irregular
Size of areas: 5 to 70 acres

Composition

Allegheny soil and similar soils: 90 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Cotaco soils, soils that have a dark surface layer, and coarse-loamy soils in landform positions similar to those of the Allegheny soil
- Hayter soils on stream terraces and colluvial fans
- Chagrin, Grigsby, Holly, and Orrville soils on flood plains
- Nelse soils on banks of major streams and rivers

Typical Profile

Surface layer:
0 to 8 inches—brown loam

Subsoil:
8 to 21 inches—yellowish brown silt loam
21 to 33 inches—dark yellowish brown silt loam
33 to 52 inches—dark yellowish brown loam

Substratum:
52 to 65 inches—yellowish brown sandy loam
65 to 89 inches—light yellowish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Natural fertility: High
Organic matter content: Low or moderate
Permeability: Moderate
Available water capacity: High
Depth to root zone: Very deep
Surface runoff: Slow or medium
Depth to water table: More than 6 feet
Flooding (frequency, months): Rare; November through April

Use and Management

Cropland
- Most areas of this soil are suited to the production of row crops, such as corn, tobacco, and garden plots.
- Soil management concerns include keeping erosion to a minimum and maintaining tilth and fertility.
- Conservation tillage, establishing and maintaining grass waterways within areas of concentrated water-flow patterns, contour farming, and managing crop residue can be used to reduce the hazard of erosion.
- Conservation tillage, the use of cover crops, and applications of lime and fertilizer help to maintain soil tilth and fertility and prevent erosion.

Pasture and hayland
- Most areas of this soil are used for the production of pasture and hay (fig. 8).
- This soil is well suited to hayland and pasture.

Figure 8.—An area of Allegheny loam, 2 to 6 percent slopes, rarely flooded, along the Levista Fork of the Big Sandy River. The soils on the terraces along the Levista and Tug Forks of the Big Sandy River are used for pasture, hay, and row crops.

- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- This soil is suited to woodland production, and yields are generally high.
- Shortleaf pine, yellow-poplar, Virginia pine, sugar maple, white ash, northern red oak, American elm, red maple, pignut hickory, black oak, white oak, eastern redcedar, and black cherry are some of the native trees.
- Some trees preferred for planting on this soil are eastern white pine, yellow-poplar, black walnut, shortleaf pine, white oak, white ash, and northern red oak.
- See table 7 for specific information relating to the potential productivity of this soil.
- The main concern in managing timber is plant competition.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for openland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Field borders are good wildlife areas.
- Trees and brush along the streams are beneficial to wildlife and help to control erosion.
- Brush piles or other nesting sites are needed.

Urban development
- This soil is well suited to most urban uses.
- Flooding is a limitation affecting some uses.

Interpretive Group

Land capability classification: IIe

AbC—Allegheny loam, 6 to 15 percent slopes, rarely flooded

Setting

Landform: River and stream terraces
Shape of areas: Irregular
Size of areas: 5 to 30 acres

Composition

Allegheny soil and similar soils: 85 percent
Contrasting components of minor extent: 15 percent

Minor Contrasting Components

- Cotaco soils, soils that have a dark surface layer, and coarse-loamy soils in landform positions similar to those of the Allegheny soil
- Hayter soils on stream terraces and colluvial fans
- Chagrin, Grigsby, Holly, and Orrville soils on flood plains
- Nelse soils on banks of major streams and rivers

Typical Profile

Surface layer:
0 to 8 inches—brown loam

Subsoil:
8 to 21 inches—yellowish brown silt loam
21 to 33 inches—dark yellowish brown silt loam
33 to 52 inches—dark yellowish brown loam

Substratum:
52 to 65 inches—yellowish brown sandy loam
65 to 89 inches—light yellowish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: Low or moderate
Permeability: Moderate
Available water capacity: High
Depth to root zone: Very deep
Surface runoff: Medium
Depth to water table: More than 6 feet
Flooding (frequency, months): Rare; November through April

Use and Management

Cropland
- Most areas of this soil are suited to the production of row crops, such as corn, tobacco, and garden plots.
- The slope and erosion hazard are management concerns in the steeper areas of the stream terraces and alluvial fans.
- Conservation tillage, establishing and maintaining grass waterways within areas of concentrated water-flow patterns, contour farming, and crop residue management can be used to reduce the hazard of erosion.
- Conservation tillage, the use of cover crops, and applications of lime and fertilizer help to maintain soil tilth and fertility and prevent erosion.

Pasture and hayland
- Most areas of this soil are used for the production of pasture and hay.
- This soil is well suited to hay and pasture, but the slope and erosion hazard may limit hay and forage production.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- This soil is suited to woodland production, and yields are generally high.
- Shortleaf pine, yellow-poplar, Virginia pine, sugar maple, white ash, northern red oak, American elm, red maple, pignut hickory, black oak, white oak, eastern redcedar, and black cherry are some of the native trees.
- Some trees preferred for planting on this soil are eastern white pine, yellow-poplar, black walnut, shortleaf pine, white oak, white ash, and northern red oak.
- See table 7 for specific information relating to the potential productivity of this soil.
- The main concern in managing timber is plant competition.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for openland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Field borders are good wildlife areas.
- Trees and brush along the streams are beneficial to wildlife and help to control erosion.
- Brush piles or other nesting sites are needed.

Urban development
- This soil is suited to most urban uses.
- The slope and flooding are the main limitations.
- The soil limitations may be overcome by sound engineering practices.

Interpretive Group

Land capability classification: IIIe

AeB—Allegheny loam, 2 to 6 percent slopes, occasionally flooded

Setting

Landform: River and stream terraces
Shape of areas: Irregular
Size of areas: 5 to 30 acres

Composition

Allegheny soil and similar soils: 90 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Cotaco soils, soils that have a dark surface layer, and coarse-loamy soils in landform positions similar to those of the Allegheny soil
- Hayter soils on stream terraces and colluvial fans
- Chagrin, Grigsby, Holly, and Orrville soils on flood plains
- Nelse soils on banks of major streams and rivers

Typical Profile

Surface layer:
0 to 8 inches—brown loam

Subsoil:
8 to 21 inches—yellowish brown silt loam
21 to 33 inches—dark yellowish brown silt loam
33 to 52 inches—dark yellowish brown loam

Substratum:
52 to 65 inches—yellowish brown sandy loam
65 to 89 inches—light yellowish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Natural fertility: High
Organic matter content: Low or moderate
Permeability: Moderate
Available water capacity: High
Depth to root zone: Very deep
Surface runoff: Slow or medium
Depth to water table: More than 6 feet
Flooding (frequency, months): Occasional; November through April

Use and Management

Cropland

- Most areas of this soil are suited to the production of row crops, such as corn, tobacco, and garden plots.
- Occasional flooding may limit production during certain years.
- The slope and erosion hazard are management concerns in the steeper areas of the steam terraces and alluvial fans.
- Conservation tillage, establishing and maintaining grass waterways within areas of concentrated water-flow patterns, contour farming, and managing crop residue can be used to reduce the hazard of erosion.
- Conservation tillage, the use of cover crops, and applications of lime and fertilizer help to maintain soil tilth and fertility and prevent erosion.

Pasture and hayland

- Most areas of this soil are used for the production of pasture and hay.
- This soil is well suited to hay and pasture.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and applications of lime and fertilizer are necessary to produce quality stands.

Woodland

- This soil is suited to woodland production, and yields are generally high.
- Shortleaf pine, yellow-poplar, Virginia pine, sugar maple, white ash, northern red oak, American elm, red maple, pignut hickory, black oak, white oak, eastern redcedar, and black cherry are some of the native trees.
- Some trees preferred for planting on this soil are eastern white pine, yellow-poplar, black walnut, shortleaf pine, white oak, white ash, and northern red oak.
- See table 7 for specific information relating to the potential productivity of this soil.
- The main concern in managing timber is plant competition.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat

- The potential for openland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Field borders are good wildlife areas.
- Trees and brush along streams are beneficial to wildlife and help to control erosion.
- Brush piles or other nesting sites are needed.

Urban development
- This soil is poorly suited to most urban uses because of the flooding.

Interpretive Group

Land capability classification: IIe

BIC—Blairton-Cruze-Marrowbone complex, 6 to 12 percent slopes

Setting

Landform: Mountain ridgetops
Shape of areas: Convex-linear
Size of areas: 5 to 15 acres

Composition

Blairton soil and similar soils: 40 percent
Cruze soil and similar soils: 30 percent
Marrowbone soil and similar soils: 20 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Cruze, Dekalb, Marrowbone, Rarden, Upshur, and Rayne soils in landform positions similar to those of the major soils
- Fairpoint, Fiveblock, and Kaymine soils in surface mined areas

Typical Profile

Blairton
Surface layer:
0 to 5 inches—brown silt loam

Subsoil:
5 to 15 inches—strong brown silt loam
15 to 23 inches—strong brown mottled channery silt loam

Transitional layer:
23 to 37 inches—light brownish gray mottled very channery silt loam

Bedrock:
37 to 47 inches—rippable shale that can be excavated

Cruze
Surface layer:
0 to 2 inches—brown silt loam

Subsoil:
2 to 6 inches—strong brown silty clay loam
6 to 18 inches—strong brown mottled silty clay
18 to 27 inches—gray mottled silty clay

Transitional layer:
27 to 39 inches—white mottled very channery silty clay loam

Substratum:
39 to 48 inches—white mottled extremely channery silty clay loam

Bedrock:
48 to 58 inches—rippable shale that can be excavated

Marrowbone
Surface layer:
0 to 4 inches—brown sandy loam

Subsoil:
4 to 10 inches—light yellowish brown channery sandy loam
10 to 23 inches—brownish yellow channery sandy loam
23 to 35 inches—yellowish brown channery sandy loam

Bedrock:
35 to 40 inches—highly weathered sandstone that can be excavated
40 inches—sandstone

Soil Properties and Qualities

Depth class: Blairton and Marrowbone—moderately deep; Cruze—deep
Drainage class: Blairton and Cruze—moderately well drained; Marrowbone—well drained
Natural fertility: Blairton and Cruze—medium; Marrowbone—very low or low
Organic matter content: Blairton and Cruze—low or moderate; Marrowbone—low to high
Permeability: Blairton—moderately slow; Cruze—moderately slow or slow; Marrowbone—moderate or moderately rapid
Available water capacity: Blairton—low; Cruze—low or moderate; Marrowbone—very low or low
Depth to root zone: Blairton and Marrowbone—moderately deep; Cruze—deep
Surface runoff: Blairton—high; Cruze—medium or high; Marrowbone—low or medium
Water table (depth, months): Blairton—1 to 2.5 feet from November through March; Cruze—1.5 to 3 feet from January through April; Marrowbone—at a depth of more than 6 feet
Flooding: None

Use and Management

Cropland
- Most areas of these soils are suited to the

production of row crops, such as corn, tobacco, and garden plots.
- Soil management concerns include keeping erosion to a minimum and maintaining tilth and fertility.
- During dry years, plant production is limited.
- Conservation tillage, establishing and maintaining grass waterways within areas of concentrated water-flow patterns, contour farming, and managing crop residue can be used to reduce the hazard of erosion.
- Conservation tillage, the use of cover crops, and applications of lime and fertilizer help to maintain soil tilth and fertility and prevent erosion.

Pasture and hayland
- Most areas of these soils are used for the production of pasture and hay.
- These soils are well suited to hay and pasture.
- The slope, erosion hazard, droughtiness, seasonal high water table, and depth of the root zone may limit hay and forage production in certain areas.
- Long-enduring, drought-tolerant grass and legume species should be selected for planting in order to provide ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- These soils are suited to woodland production, and some areas are presently in second-growth hardwoods.
- White oak, northern red oak, scarlet oak, chestnut oak, sugar maple, white ash, yellow-poplar, shortleaf pine, Virginia pine, sweet birch, black oak, and American beech are some of the native trees.
- Some trees preferred for planting on these soils are white oak, shortleaf pine, yellow-poplar, northern red oak, white ash, and eastern white pine.
- See table 7 for specific information relating to the potential productivity of these soils.
- The main concerns in managing timber are seedling mortality and plant competition.
- Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, culverts, and/or vegetative cover.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for woodland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Brushy thickets can be established by clearing small areas in large tracts of mature woodland.
- Food plots or areas of green browse can be established along logging roads and skid trails.
- The habitat in areas of native plants can be improved by disking and applying lime and fertilizer.
- Den trees should not be harvested.
- Brush piles or other nesting sites are needed.

Urban development
- These soils are poorly suited to most urban uses.
- The depth to bedrock, the slope, and a seasonal high water table are the main limitations.
- Low strength is a limitation affecting roads and streets in areas of the Cruze soil.
- The soil limitations may be overcome by sound engineering practices.

Interpretive Group

Land capability classification: IIIe

BID—Blairton-Cruze-Marrowbone complex, 12 to 25 percent slopes

Setting

Landform: Mountain ridgetops
Shape of areas: Convex-linear
Size of areas: 5 to 1,500 acres

Composition

Blairton soil and similar soils: 40 percent
Cruze soil and similar soils: 30 percent
Marrowbone soil and similar soils: 20 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Cruze, Dekalb, Marrowbone, Rarden, Upshur, and Rayne soils in landform positions similar to those of the major soils
- Fairpoint, Fiveblock, and Kaymine soils in surface mined areas

Typical Profile

Blairton
Surface layer:
0 to 5 inches—brown silt loam

Subsoil:
5 to 15 inches—strong brown silt loam
15 to 23 inches—strong brown mottled channery silt loam

Transitional layer:
23 to 37 inches—light brownish gray mottled very channery silt loam

Bedrock:
37 to 47 inches—rippable shale that can be excavated

Cruze
Surface layer:
0 to 2 inches—brown silt loam

Subsoil:
2 to 6 inches—strong brown silty clay loam
6 to 18 inches—strong brown mottled silty clay
18 to 27 inches—gray mottled silty clay

Transitional layer:
27 to 39 inches—white mottled extremely channery silty clay loam

Substratum:
39 to 48 inches—white mottled extremely channery silty clay loam

Bedrock:
48 to 58 inches—rippable shale that can be excavated

Marrowbone
Surface layer:
0 to 4 inches—brown sandy loam

Subsoil:
4 to 10 inches—light yellowish brown channery sandy loam
10 to 23 inches—brownish yellow channery sandy loam
23 to 35 inches—yellowish brown channery sandy loam

Bedrock:
35 to 40 inches—highly weathered sandstone that can be excavated
40 inches—sandstone

Soil Properties and Qualities

Depth class: Blairton and Marrowbone—moderately deep; Cruze—deep
Drainage class: Blairton and Cruze—moderately well drained; Marrowbone—well drained
Natural fertility: Blairton and Cruze—medium; Marrowbone—very low or low
Organic matter content: Blairton and Cruze—low or moderate; Marrowbone—low to high
Permeability: Blairton—moderately slow; Cruze—moderately slow or slow; Marrowbone—moderate or moderately rapid
Available water capacity: Blairton—low; Cruze—low or moderate; Marrowbone—very low or low
Depth to root zone: Blairton and Marrowbone—moderately deep; Cruze—deep
Surface runoff: Blairton and Cruze—high or very high; Marrowbone—low to high
Water table (depth, months): Blairton—1 to 2.5 feet from November through March; Cruze—1.5 to 3 feet from January through April; Marrowbone—at a depth of more than 6 feet
Flooding: None

Use and Management

Cropland
- These soils are not suited to the production of row crops.
- The slope and the hazard of erosion are the main limitations.

Pasture and hayland
- Most areas of these soils are used for the production of pasture and hay.
- These soils are well suited to hay and pasture.
- The slope, erosion hazard, droughtiness, seasonal high water table, and depth of the root zone may limit hay and forage production in certain areas.
- Long-enduring, drought-tolerant grass and legume species should be selected for planting in order to provide ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- These soils are suited to woodland production, and some areas are presently in second-growth hardwoods.
- White oak, northern red oak, scarlet oak, chestnut oak, sugar maple, white ash, yellow-poplar, shortleaf pine, Virginia pine, sweet birch, black oak, red maple, and American beech are some of the native trees.
- Some trees preferred for planting on these soils are white oak, shortleaf pine, yellow-poplar, northern red oak, white ash, and eastern white pine.
- See table 7 for specific information relating to the potential productivity of these soils.
- The main concerns in managing timber are seedling mortality and plant competition.

- Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, culverts, and/or vegetative cover.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for woodland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Brushy thickets can be established by clearing small areas in large tracts of mature woodland.
- Food plots or areas of green browse can be established along logging roads and skid trails.
- The habitat in areas of native plants can be improved by disking and applying lime and fertilizer.
- Den trees should not be harvested.
- Brush piles or other nesting sites are needed.

Urban development
- These soils are not suited to urban uses.
- The slope, the depth to bedrock, and a seasonal high water table are the main limitations.
- Low strength is a limitation affecting roads and streets in areas of the Cruze soil.
- The soil limitations may be overcome by sound engineering practices.

Interpretive Group

Land capability classification: IVe

Ch—Chagrin loam, frequently flooded

Setting

Landform: Flood plains
Slope range: 0 to 3 percent
Shape of areas: Linear
Size of areas: 5 to 25 acres

Composition

Chagrin soil and similar soils: 90 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Grigsby, Holly, and Orrville soils in landform positions similar to those of the Chagrin soil
- Moderately well drained soils
- Allegheny and Cotaco soils on stream and river terraces
- Hayter soils on stream terraces and colluvial fans
- Nelse soils on banks of major streams and rivers

Typical Profile

Surface layer:
0 to 10 inches—brown loam

Subsoil:
10 to 22 inches—dark yellowish brown loam
22 to 58 inches—dark yellowish brown mottled silt loam
58 to 82 inches—strong brown mottled silt loam

Substratum:
82 to 90 inches—strong brown mottled silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Natural fertility: High
Organic matter content: Moderate
Permeability: Moderate
Available water capacity: High
Depth to root zone: Very deep
Surface runoff: Low
Water table (depth, months): 4 to 6 feet; February and March
Flooding (frequency, months): Frequent; November through May

Use and Management

Cropland
- Most areas of this soil are suited to the production of row crops, such as corn, tobacco, and garden plots.
- Frequent flooding may limit production during certain years.

Pasture and hayland
- Most areas of this soil are used for the production of pasture and hay.
- This soil is well suited to hay and pasture.
- Frequent flooding and a seasonal high water table may limit hay and forage production during certain years.
- Flood-tolerant grass and legume species should be selected for planting in order to provide ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- This soil is suited to woodland production, and yields are generally high.
- Northern red oak, yellow-poplar, white oak, black cherry, white ash, black walnut, and sugar maple are some of the native trees.
- Some trees preferred for planting on this soil are eastern white pine, black walnut, white ash, red pine, northern red oak, white oak, and yellow-poplar.
- See table 7 for specific information relating to the potential productivity of this soil.
- The main concern in managing timber is plant competition.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for openland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Field borders are good wildlife areas.
- Trees and brush along streams are beneficial to wildlife and help to control erosion.
- Brush piles or other nesting sites are needed.

Urban development
- This soil is not suited to urban uses because of the frequent flooding.

Interpretive Group

Land capability classification: IIw

CIF—Cloverlick-Hazleton-Shelocta complex, 30 to 80 percent slopes, very stony

Setting

Landform: North- and east-facing mountain side slopes
Shape of areas: Linear with a dendritic drainage pattern
Size of areas: 50 to 1,500 acres

Composition

Cloverlick soil and similar soils: 40 percent
Hazleton soil and similar soils: 30 percent
Shelocta soil and similar soils: 20 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Fedscreek soils in similar landform positions
- Fairpoint, Fiveblock, and Kaymine soils in surface mined areas

Typical Profile

Cloverlick
Surface layer:
0 to 9 inches—very dark grayish brown very channery loam

Subsoil:
9 to 18 inches—yellowish brown channery loam
18 to 35 inches—yellowish brown extremely channery loam
35 to 48 inches—yellowish brown extremely channery loam

Transitional layer:
48 to 66 inches—yellowish brown extremely channery clay loam

Substratum:
66 to 86 inches—dark yellowish brown mottled extremely channery sandy loam

Hazleton
Surface layer:
0 to 3 inches—very dark grayish brown very channery sandy loam

Subsoil:
3 to 8 inches—light yellowish brown channery sandy loam
8 to 41 inches—brownish yellow extremely channery sandy loam
41 to 80 inches—yellowish brown extremely channery sandy loam

Shelocta
Surface layer:
0 to 3 inches—brown silt loam

Subsoil:
3 to 7 inches—yellowish brown silt loam
7 to 15 inches—dark yellowish brown silt loam
15 to 39 inches—strong brown channery silt loam
39 to 51 inches—strong brown loam and very channery silt loam

Bedrock:
51 to 61 inches—fractured siltstone that can be excavated with difficultly

Soil Properties and Qualities

Depth class: Cloverlick and Hazleton—very deep; Shelocta—deep
Drainage class: Well drained
Natural fertility: Cloverlick and Shelocta—medium; Hazleton—low

Organic matter content: Cloverlick—high; Hazleton—moderate; Shelocta—low to high
Permeability: Cloverlick—moderate or moderately rapid; Hazleton—moderately rapid or rapid; Shelocta—moderate
Available water capacity: Cloverlick and Shelocta—moderate or high; Hazleton—low or moderate
Depth to root zone: Cloverlick and Hazleton—very deep; Shelocta—deep
Surface runoff: Cloverlick and Hazleton—medium or high; Shelocta—high
Depth to water table: More than 6 feet
Flooding: None

Use and Management

Cropland
- These soils are not suited to cultivated crops because of the slope, the hazard of erosion, and surface stones.

Pasture and hayland
- These soils are not suited to hay or pasture because of the slope, the hazard of erosion, and surface stones.
- Several areas adjacent to the stream valleys, however, have been cleared and are used as unimproved pasture.

Woodland
- These soils are used mainly for woodland production, and some are currently in second-growth hardwoods.
- Northern red oak, white oak, black oak, black locust, American beech, yellow-poplar, sugar maple, and chestnut oak are some of the native trees.
- Some trees preferred for planting on these soils are white oak, northern red oak, white ash, shortleaf pine, eastern white pine, and yellow-poplar.
- See table 7 for specific information relating to the potential productivity of these soils.
- The main concerns in managing timber are the hazard of erosion, equipment limitations, seedling mortality, and plant competition.
- Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, culverts, and/or vegetative cover.
- The slope, surface stones, and rock outcrops restrict the use of wheeled and tracked equipment on skid trails.
- Cable skidding is safer and disturbs the soil less than other harvesting methods.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for woodland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Brushy thickets can be established by clearing small areas in large tracts of mature woodland.
- Food plots or areas of green browse can be established along logging roads and skid trails.
- The habitat in areas of native plants can be improved by disking and applying lime and fertilizer.
- Den trees should not be harvested.
- Brush piles or other nesting sites are needed.

Urban development
- These soils are not suited to urban uses because of the slope and surface stones.

Interpretive Group

Land capability classification: VIIe

CmB—Cotaco silt loam, 0 to 4 percent slopes

Setting

Landform: River and stream terraces
Shape of areas: Irregular
Size of areas: 5 to 10 acres

Composition

Cotaco soil and similar soils: 90 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Allegheny soils in landform positions similar to those of the Cotaco soil
- Chagrin, Grigsby, Holly, and Orrville soils on flood plains
- Hayter soils on stream terraces and colluvial fans
- Nelse soils on banks of major streams and rivers

Typical Profile

Surface layer:
0 to 9 inches—dark yellowish brown silt loam

Subsoil:
9 to 19 inches—brown mottled silt loam
19 to 25 inches—yellowish brown and light brownish gray silt loam
25 to 40 inches—light brownish gray and strong brown silt loam
40 to 55 inches—light brownish gray mottled silt loam

Substratum:
55 to 77 inches—light brownish gray mottled silt loam
77 to 85 inches—strong brown mottled silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Natural fertility: Medium
Organic matter content: Low or moderate
Permeability: Moderate
Available water capacity: Low or moderate
Depth to root zone: Very deep
Surface runoff: Low
Water table (depth, months): 1.5 to 2.5 feet; November through May
Flooding: None

Use and Management

Cropland
- Most areas of this soil are suited to the production of row crops, such as corn, tobacco, and garden plots.
- A seasonal high water table may limit production during certain years.

Pasture and hayland
- Most areas of this soil are used for the production of pasture and hay.
- This soil is suited to hay and pasture.
- A seasonal high water table may limit hay and forage production during certain years.
- Grass and legume species that are adapted to a seasonal high water table should be selected for planting in order to provide ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- This soil is suited to woodland production, and yields are generally high.
- Virginia pine, yellow-poplar, sweet birch, American elm, black oak, white oak, American beech, black walnut, blackgum, scarlet oak, and American elm are some of the native trees.
- Some trees preferred for planting on this soil are eastern white pine, yellow-poplar, sweetgum, white oak, and black oak.
- See table 7 for specific information relating to the potential productivity of this soil.
- The main concern in managing timber is plant competition.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for openland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Field borders are good wildlife areas.
- Trees and brush along the streams are beneficial to wildlife and help to control erosion.
- Brush piles or other nesting sites are needed.

Urban development
- This soil is poorly suited to most urban uses.
- A seasonal high water table is a limitation affecting most urban uses.
- The seasonal high water table may be overcome by sound engineering practices.

Interpretive Group

Land capability classification: IIw

CmC—Cotaco silt loam, 4 to 12 percent slopes

Setting

Landform: River and stream terraces
Shape of areas: Irregular
Size of areas: 5 to 15 acres

Composition

Cotaco soil and similar soils: 90 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Allegheny soils in landform positions similar to those of the Cotaco soil
- Chagrin, Grigsby, Holly, and Orrville soils on flood plains
- Hayter soils on stream terraces and colluvial fans
- Nelse soils on banks of major streams and rivers

Typical Profile

Surface layer:
0 to 9 inches—dark yellowish brown silt loam

Subsoil:
9 to 19 inches—brown mottled silt loam
19 to 25 inches—yellowish brown and light brownish gray silt loam

25 to 40 inches—light brownish gray and strong brown silt loam
40 to 55 inches—light brownish gray mottled silt loam

Substratum:
55 to 77 inches—light brownish gray mottled silt loam
77 to 85 inches—strong brown mottled silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Natural fertility: Medium
Organic matter content: Low or moderate
Permeability: Moderate
Available water capacity: Low or moderate
Depth to root zone: Very deep
Surface runoff: Medium
Water table (depth, months): 1.5 to 2.5 feet; November through May
Flooding: None

Use and Management

Cropland
- Most areas of this soil are suited to the production of row crops, such as corn, tobacco, and garden plots.
- A seasonal high water table may limit production during certain years.
- The slope and erosion hazard are management concerns in the steeper areas of the steam terraces and alluvial fans.
- Conservation tillage, establishing and maintaining grass waterways within areas of concentrated water-flow patterns, contour farming, and crop residue management can be used to reduce the hazard of erosion.
- Conservation tillage, the use of cover crops, and applications of lime and fertilizer help to maintain soil tilth and fertility and prevent erosion.

Pasture and hayland
- Most areas of this soil are used for the production of pasture and hay.
- This soil is suited to hay and pasture.
- A seasonal high water table may limit hay and forage production during certain years.
- Grass and legume species that are adapted to a seasonal high water table should be selected for planting in order to provide ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- This soil is suited to woodland production, and yields are generally high.
- Virginia pine, yellow-poplar, sweet birch, American elm, black oak, white oak, American beech, black walnut, blackgum, scarlet oak, and American elm are some of the native trees.
- Some trees preferred for planting on this soil are eastern white pine, yellow-poplar, sweetgum, white oak, and black oak.
- See table 7 for specific information relating to the potential productivity of this soil.
- The main concern in managing timber is plant competition.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for openland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Field borders are good wildlife areas.
- Trees and brush along the streams are beneficial to wildlife and help to control erosion.
- Brush piles or other nesting sites are needed.

Urban development
- This soil is poorly suited to most urban uses.
- A seasonal high water table and the slope are limitations.
- The soil limitations may be overcome by sound engineering practices.

Interpretive Group

Land capability classification: IIIe

CoB—Cotaco silt loam, 0 to 4 percent slopes, rarely flooded

Setting

Landform: River and stream terraces
Shape of areas: Irregular
Size of areas: 5 to 15 acres

Composition

Cotaco soil and similar soils: 90 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Allegheny soils in landform positions similar to those of the Cotaco soil

- Chagrin, Grigsby, Holly, and Orrville soils on flood plains
- Hayter soils on stream terraces and colluvial fans
- Nelse soils on banks of major streams and rivers

Typical Profile

Surface layer:
0 to 9 inches—dark yellowish brown silt loam

Subsoil:
9 to 19 inches—brown mottled silt loam
19 to 25 inches—yellowish brown and light brownish gray silt loam
25 to 40 inches—light brownish gray and strong brown silt loam
40 to 55 inches—light brownish gray mottled silt loam

Substratum:
55 to 77 inches—light brownish gray mottled silt loam
77 to 85 inches—strong brown mottled silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Natural fertility: Medium
Organic matter content: Low or moderate
Permeability: Moderate
Available water capacity: Low or moderate
Depth to root zone: Very deep
Surface runoff: Low
Water table (depth, months): 1.5 to 2.5 feet; November through May
Flooding (frequency, months): Rare; November through April

Use and Management

Cropland
- Most areas of this soil are suited to the production of row crops, such as corn, tobacco, and garden plots.
- Rare flooding and a seasonal high water table may limit production during certain years.

Pasture and hayland
- Most areas of this soil are used for the production of pasture and hay.
- This soil is suited to hay and pasture.
- A seasonal high water table may limit hay and forage production during certain years.
- Grass and legume species that are adapted to a seasonal high water table should be selected for planting in order to provide ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- This soil is suited to woodland production, and yields are generally high.
- Virginia pine, yellow-poplar, sweet birch, American elm, black oak, white oak, American beech, black walnut, blackgum, scarlet oak, and American elm are some of the native trees.
- Some trees preferred for planting on this soil are eastern white pine, yellow-poplar, sweetgum, white oak, and black oak.
- See table 7 for specific information relating to the potential productivity of this soil.
- The main concern in managing timber is plant competition.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for openland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Field borders are good wildlife areas.
- Trees and brush along the streams are beneficial to wildlife and help to control erosion.
- Brush piles or other nesting sites are needed.

Urban development
- This soil is poorly suited to most urban uses.
- A seasonal high water table is a limitation.
- The seasonal high water table may be overcome by sound engineering practices.
- Flooding is a limitation affecting some urban uses.

Interpretive Group

Land capability classification: IIw

CoC—Cotaco silt loam, 4 to 12 percent slopes, rarely flooded

Setting

Landform: River and stream terraces
Shape of areas: Irregular
Size of areas: 5 to 35 acres

Composition

Cotaco soil and similar soils: 90 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Allegheny soils in landform positions similar to those of the Cotaco soil
- Chagrin, Grigsby, Holly, and Orrville soils on flood plains
- Hayter soils on stream terraces and colluvial fans
- Nelse soils on banks of major streams and rivers

Typical Profile

Surface layer:
0 to 9 inches—dark yellowish brown silt loam

Subsoil:
9 to 19 inches—brown mottled silt loam
19 to 25 inches—yellowish brown and light brownish gray silt loam
25 to 40 inches—light brownish gray and strong brown silt loam
40 to 55 inches—light brownish gray mottled silt loam

Substratum:
55 to 77 inches—light brownish gray mottled silt loam
77 to 85 inches—strong brown mottled silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Natural fertility: Medium
Organic matter content: Low or moderate
Permeability: Moderate
Available water capacity: Low or moderate
Depth to root zone: Very deep
Surface runoff: Medium
Water table (depth, months): 1.5 to 2.5 feet; November through May
Flooding (frequency, months): Rare; November through April

Use and Management

Cropland
- Most areas of this soil are suited to the production of row crops, such as corn, tobacco, and garden plots.
- Rare flooding and a seasonal high water table may limit production during certain years.
- The slope and erosion hazard are management concerns in the steeper areas of the steam terraces and alluvial fans.
- Conservation tillage, establishing and maintaining grass waterways within areas of concentrated water-flow patterns, contour farming, and crop residue management can be used to reduce the hazard of erosion.
- Conservation tillage, the use of cover crops, and applications of lime and fertilizer help to maintain soil tilth and fertility and prevent erosion.

Pasture and hayland
- Most areas of this soil are used for the production of pasture and hay.
- This soil is suited to hay and pasture.
- A seasonal high water table may limit hay and forage production during certain years.
- Grass and legume species that are adapted to a seasonal high water table should be selected for planting in order to provide ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- This soil is suited to woodland production, and yields are generally high.
- Virginia pine, yellow-poplar, sweet birch, American elm, black oak, white oak, American beech, black walnut, blackgum, scarlet oak, and American elm are some of the native trees.
- Some trees preferred for planting on this soil are eastern white pine, yellow-poplar, sweetgum, white oak, and black oak.
- See table 7 for specific information relating to the potential productivity of this soil.
- The main concern in managing timber is plant competition.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for openland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Field borders are good wildlife areas.
- Trees and brush along the streams are beneficial to wildlife and help to control erosion.
- Brush piles or other nesting sites are needed.

Urban development
- This soil is poorly suited to most urban uses.
- A seasonal high water table and the slope are limitations.
- The soil limitations may be overcome by sound engineering practices.
- Flooding is a limitation affecting some urban uses.

Interpretive Group

Land capability classification: IIIe

CtB—Cotaco silt loam, 0 to 4 percent slopes, occasionally flooded

Setting

Landform: River and stream terraces
Shape of areas: Irregular
Size of areas: 5 to 40 acres

Composition

Cotaco soil and similar soils: 90 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Allegheny soils in landform positions similar to those of the Cotaco soil
- Chagrin, Grigsby, Holly, and Orrville soils on flood plains
- Hayter soils on stream terraces and colluvial fans
- Nelse soils on banks of major streams and rivers

Typical Profile

Surface layer:
0 to 9 inches—dark yellowish brown silt loam

Subsoil:
9 to 19 inches—brown mottled silt loam
19 to 25 inches—yellowish brown and light brownish gray silt loam
25 to 40 inches—light brownish gray and strong brown silt loam
40 to 55 inches—light brownish gray mottled silt loam

Substratum:
55 to 77 inches—light brownish gray mottled silt loam
77 to 85 inches—strong brown mottled silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Natural fertility: Medium
Organic matter content: Low or moderate
Permeability: Moderate
Available water capacity: Low or moderate
Depth to root zone: Very deep
Surface runoff: Low
Water table (depth, months): 1.5 to 2.5 feet; November through May
Flooding (frequency, months): Occasional; November through April

Use and Management

Cropland
- Most areas of this soil are suited to the production of row crops, such as corn, tobacco, and garden plots.
- A seasonal high water table and occasional flooding may limit production during certain years.

Pasture and hayland
- Most areas of this soil are used for the production of pasture and hay.
- This soil is suited to hay and pasture.
- A seasonal high water table and occasional flooding may limit hay and forage production during certain years.
- Grass and legume species that are adapted to a seasonal high water table should be selected for planting in order to provide ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- This soil is suited to woodland production, and yields are generally high.
- Virginia pine, yellow-poplar, sweet birch, American elm, black oak, white oak, American beech, black walnut, blackgum, scarlet oak, and American elm are some of the native trees.
- Some trees preferred for planting on this soil are eastern white pine, yellow-poplar, sweetgum, white oak, and black oak.
- See table 7 for specific information relating to the potential productivity of this soil.
- The main concern in managing timber is plant competition.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for openland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Field borders are good wildlife areas.
- Trees and brush along the streams are beneficial to wildlife and help to control erosion.
- Brush piles or other nesting sites are needed.

Urban development
- This soil is poorly suited to most urban uses.

- A seasonal high water table is a limitation.
- The seasonal high water table may be overcome by sound engineering practices.
- Flooding is a limitation affecting some urban uses.

Interpretive Group

Land capability classification: IIw

DAM—Dams, large

This map unit consists of one dam located in Lawrence County. This dam was built to create Yatesville Lake. It is a rockfill dam with a central impervious core and is founded on rock. The dam is 156 feet high, 855 feet long, and 32 feet wide across the top of the dam. The elevation at the top of the dam is 682.5 feet mean sea level.

Because areas of this map unit are so variable, no generalized interpretations can be given.

Dm—Dumps, mine; tailings; and tipples

Setting

Landform: Mountains
Shape of areas: Irregular
Size of areas: 5 to 200 acres

Composition

Dumps, mine; tailings; and tipples and similar inclusions: 90 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Fairpoint, Fiveblock, and Kaymine soils in similar landform positions
- Beech, Cloverlick, Fedscreek, Hazleton, Shelocta, and Vandalia soils on side slopes
- Blairton, Cruze, Dekalb, Marrowbone, Rarden, Upshur, and Rayne soils on ridgetops
- Allegheny and Cotaco soils on stream terraces
- Hayter soils on stream terraces and colluvial fans
- Chagrin, Grigsby, Holly, and Orrville soils on flood plains
- Nelse soils on banks of major streams and rivers

Typical Profile

This map unit consists of slag (unmarketable impurities that are left after the washing of coal) that is placed in valley fills, coal-washing facilities, tipples, and all other buildings and equipment associated with the handling of coal (fig. 9). Because of the variability of the material, a typical profile is not given.

Soil Properties and Qualities

Depth class: Variable
Drainage class: Variable
Natural fertility: Very low
Organic matter content: Very low
Permeability: Variable
Available water capacity: Variable
Depth to root zone: Variable
Surface runoff: Variable
Depth to water table: More than 6 feet
Flooding: None

Use and Management

Cropland
- Areas of this map unit are not suited to cultivated crops because of droughtiness, very low fertility, and a high content of rock fragments in some places.

Pasture and hayland
- Areas of this map unit are not suited to hay or pasture because of droughtiness, very low fertility, and a high content of rock fragments in some places.

Woodland
- Areas of this map unit are not suited to woodland because of droughtiness, very low fertility, and a high content of rock fragments in some places.
- Some drought-tolerant species, such as black locust, have been planted with limited success.

Wildlife habitat
- Areas of this map unit are suited to wildlife habitat if the steeper slopes are shaped and smoothed with earthmoving equipment, if correct amounts of lime, fertilizer, and mulch are applied, and if drought-tolerant plant species are selected for planting.

Urban development
- Because areas of this map unit are so variable, no generalized interpretations for urban uses can be given.

Interpretive Group

Land capability classification: None assigned

FiB—Fiveblock, Fairpoint, and Kaymine soils, 0 to 6 percent slopes, stony

Setting

Landform: Mountains
Shape of areas: Irregular
Size of areas: 10 to 50 acres

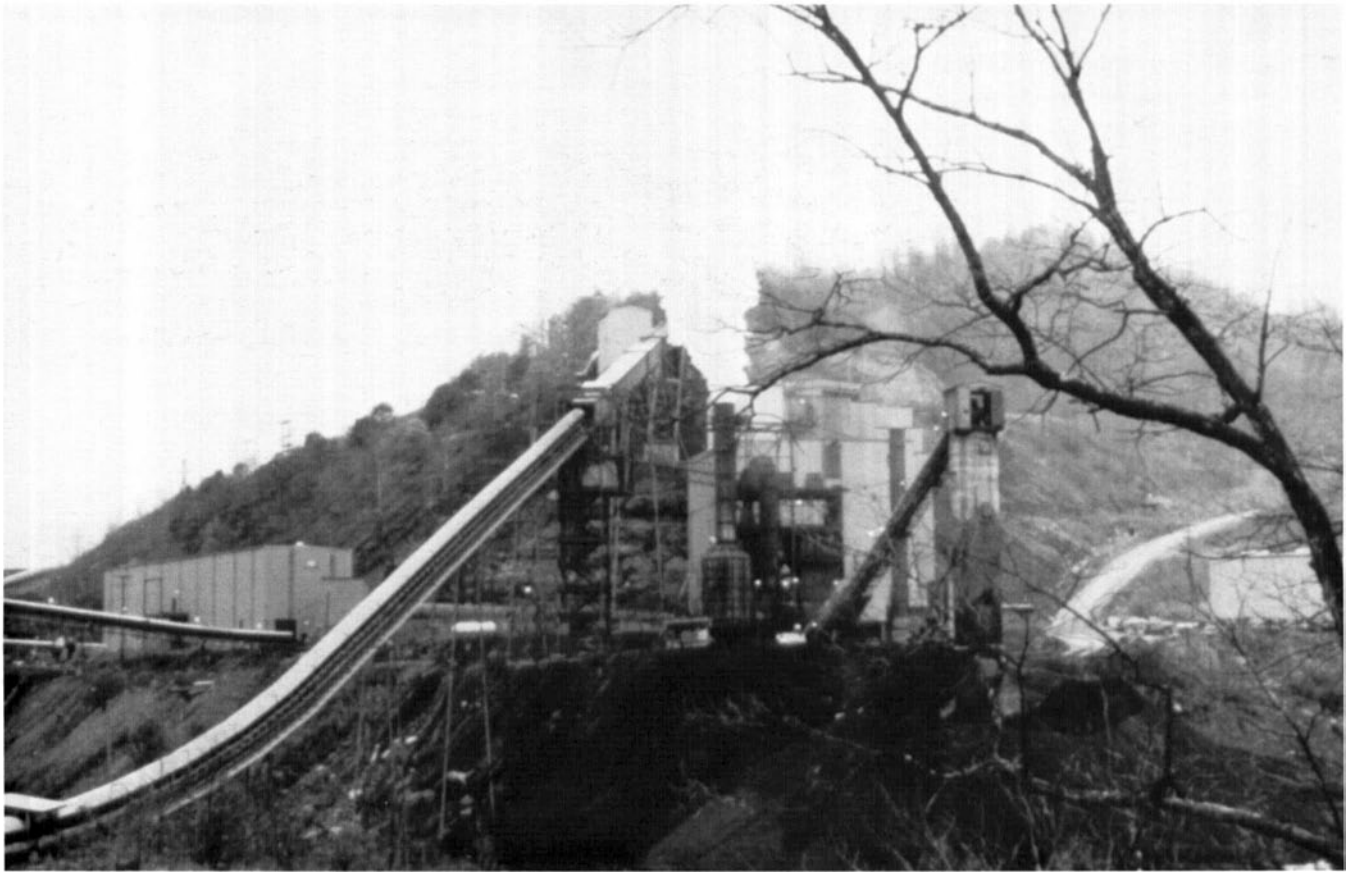


Figure 9.—A coal-processing plant in an area of Dumps, mine; tailings; and tipples, in Martin County.

Composition

Fiveblock soil and similar soils: 30 percent
Fairpoint soil and similar soils: 30 percent
Kaymine soil and similar soils: 30 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Soils influenced by calcareous materials, soils that are extremely acid and are too toxic to support plant life, and dumps in similar landform positions
- Blairton, Cruze, Dekalb, Marrowbone, and Rayne soils on ridgetops
- Cloverlick, Fedscreek, Hazleton, and Shelocta soils on side slopes

Typical Profile

Fiveblock
Surface layer:
0 to 4 inches—dark yellowish brown channery sandy loam
Substratum:
4 to 18 inches—dark yellowish brown extremely channery sandy loam
18 to 48 inches—brown extremely flaggy sandy loam
48 to 65 inches—yellowish brown extremely flaggy sandy loam
65 to 80 inches—brown extremely flaggy sandy loam

Fairpoint
Surface layer:
0 to 7 inches—very dark gray mottled channery silt loam
Substratum:
7 to 19 inches—dark gray mottled very channery silt loam
19 to 30 inches—dark grayish brown mottled very flaggy silt loam
30 to 80 inches—olive gray mottled extremely flaggy silt loam

Kaymine
Surface layer:
0 to 6 inches—brown mottled channery loam

Substratum:
6 to 15 inches—dark grayish brown extremely channery loam
15 to 23 inches—grayish brown extremely channery loam
23 to 46 inches—grayish brown extremely flaggy loam
46 to 80 inches—dark grayish brown extremely flaggy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Fiveblock—somewhat excessively drained; Fairpoint and Kaymine—well drained
Natural fertility: Low
Organic matter content: Fiveblock and Fairpoint—low; Kaymine—low or moderate
Permeability: Fiveblock—moderately rapid or rapid; Fairpoint—moderately slow; Kaymine—moderate or moderately rapid
Available water capacity: Fiveblock—low or moderate; Fairpoint—very low to moderate; Kaymine—low to high
Depth to root zone: Very deep
Surface runoff: Fiveblock—negligible or very low; Fairpoint—medium; Kaymine—low or very low
Depth to water table: More than 6 feet
Flooding: None

Use and Management

Cropland
- These soils are poorly suited to the production of row crops.
- Rock fragments and droughtiness are the main limitations.

Pasture and hayland
- These soils are suited to hay and pasture.
- Most of the grasses and legumes grown in the survey area will grow on these soils.
- Coarse fragments and large stones restrict the use of tillage implements, and settling is irregular in places.
- Vegetative treatment that provides a quick and permanent cover helps to control erosion.
- In seeding areas of this map unit, the soil material must be graded smooth so that equipment can be used without interference during planting, harvesting, and maintenance operations.
- Proper seedbed preparation, good-quality seed, mulch, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- These soils are suited to woodland production.
- Seedling mortality and plant competition are the main limitations.
- Large stones and rock fragments restrict the use of equipment.
- Eastern white pine, black locust, and autumn olive are trees commonly used for reclamation.
- Some trees preferred for planting on these soils are Virginia pine, yellow-poplar, red maple, American sycamore, Scotch pine, white spruce, and blue spruce.
- Good-quality planting stock is required for maximum survival and growth.
- See table 7 for specific information relating to the potential productivity of these soils.

Wildlife habitat
- Areas of this map unit that are graded and planted with either herbaceous or woody plants have good potential for wildlife food and cover.
- Any planting that provides adequate vegetative cover and controls erosion is beneficial to wildlife.
- Contour strip planting of herbaceous plants and trees is more beneficial than solid plantings.

Urban development
- These soils are poorly suited to most urban uses.
- Surface stones, irregular landforms, and variable permeability are the main limitations.
- The moderately slow permeability in areas of the Fairpoint soil is a limitation for septic tank absorption fields.
- Rock fragments interfere with most urban uses.
- These soils are subject to settling, especially for the first few years after mining.

Interpretive Group

Land capability classification: VIs

FiD—Fiveblock, Fairpoint, and Kaymine soils, 6 to 30 percent slopes, stony

Setting

Landform: Mountains
Shape of areas: Irregular
Size of areas: 5 to 150 acres

Composition

Fiveblock soil and similar soils: 30 percent
Fairpoint soil and similar soils: 30 percent
Kaymine soil and similar soils: 30 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Soils influenced by calcareous materials, soils that are extremely acid and are too toxic to support plant life, and dumps in similar landform positions
- Blairton, Cruze, Dekalb, Marrowbone, and Rayne soils on ridgetops
- Cloverlick, Fedscreek, Hazleton, and Shelocta soils on side slopes

Typical Profile

Fiveblock
Surface layer:
0 to 4 inches—dark yellowish brown channery sandy loam

Substratum:
4 to 18 inches—dark yellowish brown extremely channery sandy loam
18 to 48 inches—brown extremely flaggy sandy loam
48 to 65 inches—yellowish brown extremely flaggy sandy loam
65 to 80 inches—brown extremely flaggy sandy loam

Fairpoint
Surface layer:
0 to 7 inches—very dark gray mottled channery silt loam

Substratum:
7 to 19 inches—dark gray mottled very channery silt loam
19 to 30 inches—dark grayish brown mottled very flaggy silt loam
30 to 80 inches—olive gray mottled extremely flaggy silt loam

Kaymine
Surface layer:
0 to 6 inches—brown mottled channery loam

Substratum:
6 to 15 inches—dark grayish brown extremely channery loam
15 to 23 inches—grayish brown extremely channery loam
23 to 46 inches—grayish brown extremely flaggy loam
46 to 80 inches—dark grayish brown extremely flaggy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Fiveblock—somewhat excessively drained; Fairpoint and Kaymine—well drained
Natural fertility: Low
Organic matter content: Fiveblock and Fairpoint—low; Kaymine—low or moderate
Permeability: Fiveblock—moderately rapid or rapid; Fairpoint—moderately slow; Kaymine—moderate or moderately rapid
Available water capacity: Fiveblock—low or moderate; Fairpoint—very low to moderate; Kaymine—low to high
Depth to root zone: Very deep
Surface runoff: Fiveblock—very low to medium; Fairpoint—high or very high; Kaymine—slow or medium
Depth to water table: More than 6 feet
Flooding: None

Use and Management

Cropland
- These soils are poorly suited to the production of row crops.
- The slope, surface stones, and droughtiness are the main limitations.

Pasture and hayland
- These soils are suited to hay and pasture.
- Most of the grasses and legumes grown in the survey area will grow on these soils.
- The slope, large stones and coarse fragments on the surface, slumping, and settling are the main limitations.
- Vegetative treatment that provides a quick and permanent cover helps to control erosion.
- In seeding areas of this map unit, the soil material must be graded smooth so that equipment can be used without interference during planting, harvesting, and maintenance operations.
- Proper seedbed preparation, good-quality seed, mulch, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- These soils are suited to woodland production.
- The hazard of erosion, equipment limitations, seedling mortality, and plant competition are the main limitations.
- Large stones and rock fragments restrict the use of equipment.
- Eastern white pine, black locust, and autumn olive are trees commonly used for reclamation.
- Some trees preferred for planting on these soils are Virginia pine, yellow-poplar, red maple, Scotch pine, white spruce, blue spruce, and American sycamore.
- Good-quality planting stock is required for maximum survival and growth.
- See table 7 for specific information relating to the potential productivity of these soils.

Wildlife habitat
- Areas of this map unit that are graded and planted with either herbaceous or woody plants have good potential for wildlife food and cover.
- Any planting that provides adequate vegetative cover and controls erosion is beneficial to wildlife.
- Contour strip planting of herbaceous plants and trees is more beneficial than solid plantings.

Urban development
- These soils are poorly suited to most urban uses.
- The slope, surface stones, irregular landforms, and variable permeability are the main limitations.
- The moderately slow permeability in areas of the Fairpoint soil is a limitation for septic tank absorption fields.
- Rock fragments interfere with most urban uses.
- These soils are subject to settling, especially for the first few years after mining.

Interpretive Group

Land capability classification: VIs

FiF—Fiveblock, Fairpoint, and Kaymine soils, 30 to 80 percent slopes, stony

Setting

Landform: Mountains
Shape of areas: Irregular
Size of areas: 5 to 500 acres

Composition

Fiveblock soil and similar soils: 30 percent
Fairpoint soil and similar soils: 30 percent
Kaymine soil and similar soils: 30 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Soils influenced by calcareous materials, soils that are extremely acid and are too toxic to support plant life, and dumps in similar landform positions
- Blairton, Cruze, Dekalb, Marrowbone, and Rayne soils on ridgetops
- Cloverlick, Fedscreek, Hazleton, and Shelocta soils on side slopes

Typical Profile

Fiveblock
Surface layer:
0 to 4 inches—dark yellowish brown channery sandy loam

Substratum:
4 to 18 inches—dark yellowish brown extremely channery sandy loam
18 to 48 inches—brown extremely flaggy sandy loam
48 to 65 inches—yellowish brown extremely flaggy sandy loam
65 to 80 inches—brown extremely flaggy sandy loam

Fairpoint
Surface layer:
0 to 7 inches—very dark gray mottled channery silt loam

Substratum:
7 to 19 inches—dark gray mottled very channery silt loam
19 to 30 inches—dark grayish brown mottled very flaggy silt loam
30 to 80 inches—olive gray mottled extremely flaggy silt loam

Kaymine
Surface layer:
0 to 6 inches—brown mottled channery loam

Substratum:
6 to 15 inches—dark grayish brown extremely channery loam
15 to 23 inches—grayish brown extremely channery loam
23 to 46 inches—grayish brown extremely flaggy loam
46 to 80 inches—dark grayish brown extremely flaggy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Fiveblock—somewhat excessively drained; Fairpoint and Kaymine—well drained
Natural fertility: Low
Organic matter content: Fiveblock and Fairpoint—low; Kaymine—low or moderate
Permeability: Fiveblock—moderately rapid or rapid; Fairpoint—moderately slow; Kaymine—moderate or moderately rapid
Available water capacity: Fiveblock—low or moderate; Fairpoint—very low to moderate; Kaymine—low to high
Depth to root zone: Very deep
Surface runoff: Fiveblock and Kaymine—low or medium; Fairpoint—very high
Depth to water table: More than 6 feet
Flooding: None

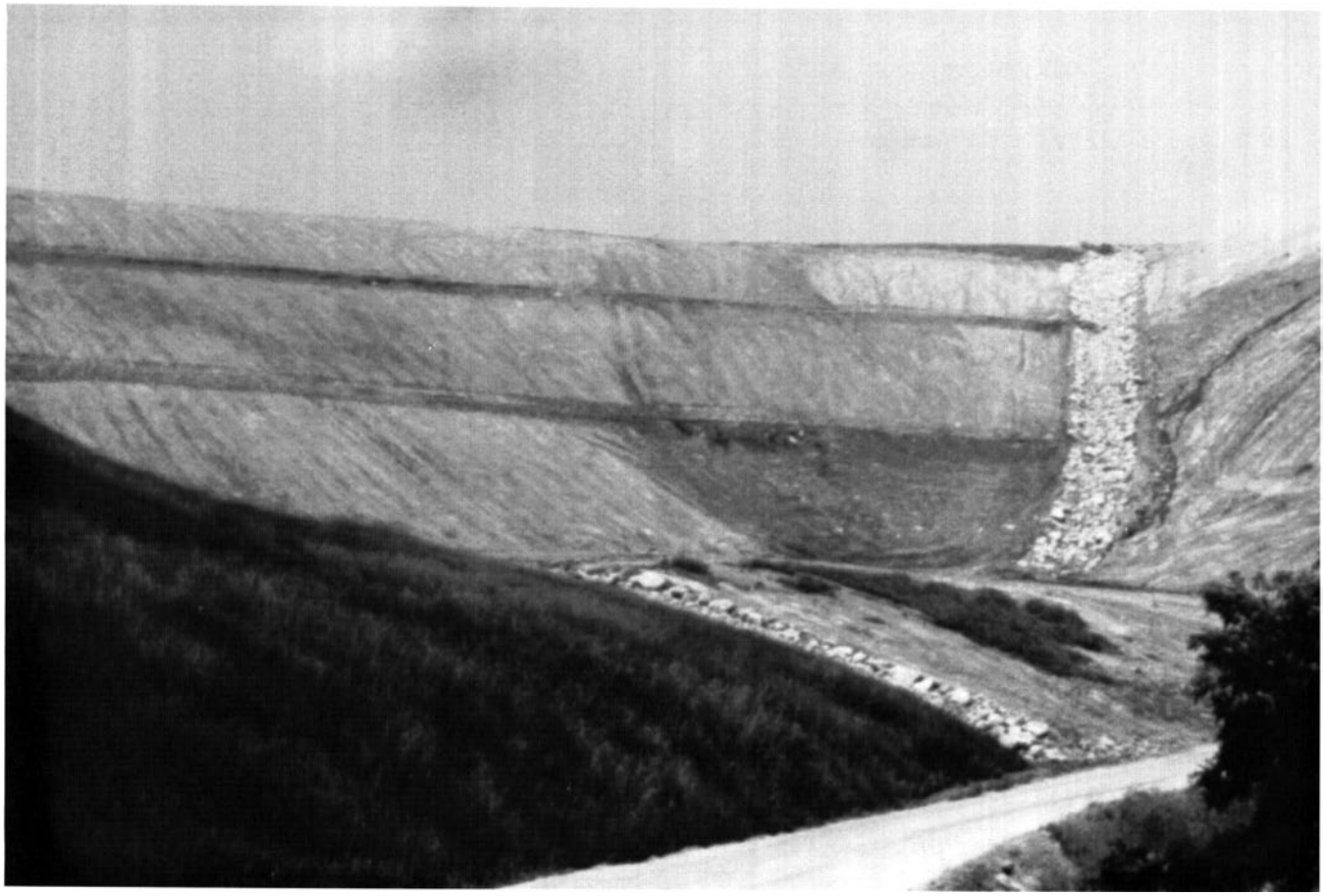


Figure 10.—An area of Fiveblock, Fairpoint, and Kaymine soils, 30 to 80 percent slopes, stony, on a recently reclaimed surface coal mine in Martin County. The steep and very steep reclaimed surface mined areas provide good habitat for wildlife.

Use and Management

Cropland

- These soils are not suited to the production of row crops.
- The slope, the hazard of erosion, surface stones, and droughtiness are the main limitations.

Pasture and hayland

- These soils are not suited to hay or pasture.
- The slope, large stones and coarse fragments on the surface, and slumping and settling are the main limitations.
- Proper seedbed preparation, good-quality seed, mulch, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland

- These soils are suited to woodland production.
- The hazard of erosion, equipment limitations, seedling mortality, and plant competition are the main limitations.
- Large stones and rock fragments restrict the use of equipment.
- Eastern white pine, black locust, and autumn olive are trees commonly used for reclamation.
- Some trees preferred for planting on these soils are Virginia pine, yellow-poplar, red maple, Scotch pine, American sycamore, white spruce, and blue spruce.
- Good-quality planting stock is required for maximum survival and growth.
- See table 7 for specific information relating to the potential productivity of these soils.

Wildlife habitat

- Areas that are graded and planted with either herbaceous or woody plants have good potential for wildlife food and cover (fig. 10).
- Any planting that provides adequate vegetative cover and controls erosion is beneficial to wildlife.
- Contour strip planting of herbaceous plants and trees is more beneficial than solid plantings.

Urban development
- These soils are poorly suited to most urban uses.
- The slope, surface stones, irregular landforms, and variable permeability are the main limitations.
- The moderately slow permeability in areas of the Fairpoint soil is a limitation for septic tank absorption fields.
- Rock fragments interfere with most urban uses.
- These soils are subject to settling, especially for the first few years after mining.

Interpretive Group

Land capability classification: VIIe

Gr—Grigsby fine sandy loam, frequently flooded

Setting

Landform: Flood plains
Slope range: 0 to 3 percent
Shape of areas: Linear
Size of areas: 5 to 100 acres

Composition

Grigsby soil and similar soils: 90 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Chagrin, Holly, and Orrville soils in landform positions similar to those of the Grigsby soil
- Moderately well drained soils
- Allegheny and Cotaco soils on stream and river terraces
- Hayter soils on stream terraces and colluvial fans
- Nelse soils on banks of major streams and rivers

Typical Profile

Surface layer:
0 to 11 inches—brown fine sandy loam

Subsoil:
11 to 19 inches—brown sandy loam
19 to 32 inches—dark yellowish brown fine sandy loam
32 to 54 inches—yellowish brown fine sandy loam
54 to 64 inches—dark yellowish brown fine sandy loam

Substratum:
64 to 80 inches—yellowish brown mottled loam and sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: Low or moderate
Permeability: Moderate or moderately rapid
Available water capacity: Moderate
Depth to root zone: Very deep
Surface runoff: Low or very low
Water table (depth, months): 3.5 to 6 feet; January through April
Flooding (frequency, months): Frequent; December through May

Use and Management

Cropland
- Most areas of this soil are suited to the production of row crops, such as corn, tobacco, and garden plots.
- Frequent flooding may limit production during certain years (fig. 11).

Pasture and hayland
- Most areas of this soil are used for the production of pasture and hay.
- This soil is well suited to hay and pasture.
- Frequent flooding may limit hay and forage production during certain years.
- Flood-tolerant grass and legume species should be selected for planting in order to provide ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, good-quality seed, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- This soil is suited to woodland production, and yields are generally high.
- Plant competition is the main limitation.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.
- Northern red oak, yellow-poplar, white oak, white ash, sweetgum, black walnut, and red maple are some of the native trees.
- Some trees preferred for planting on this soil are eastern white pine, black walnut, white ash, shortleaf pine, northern red oak, white oak, and yellow-poplar.

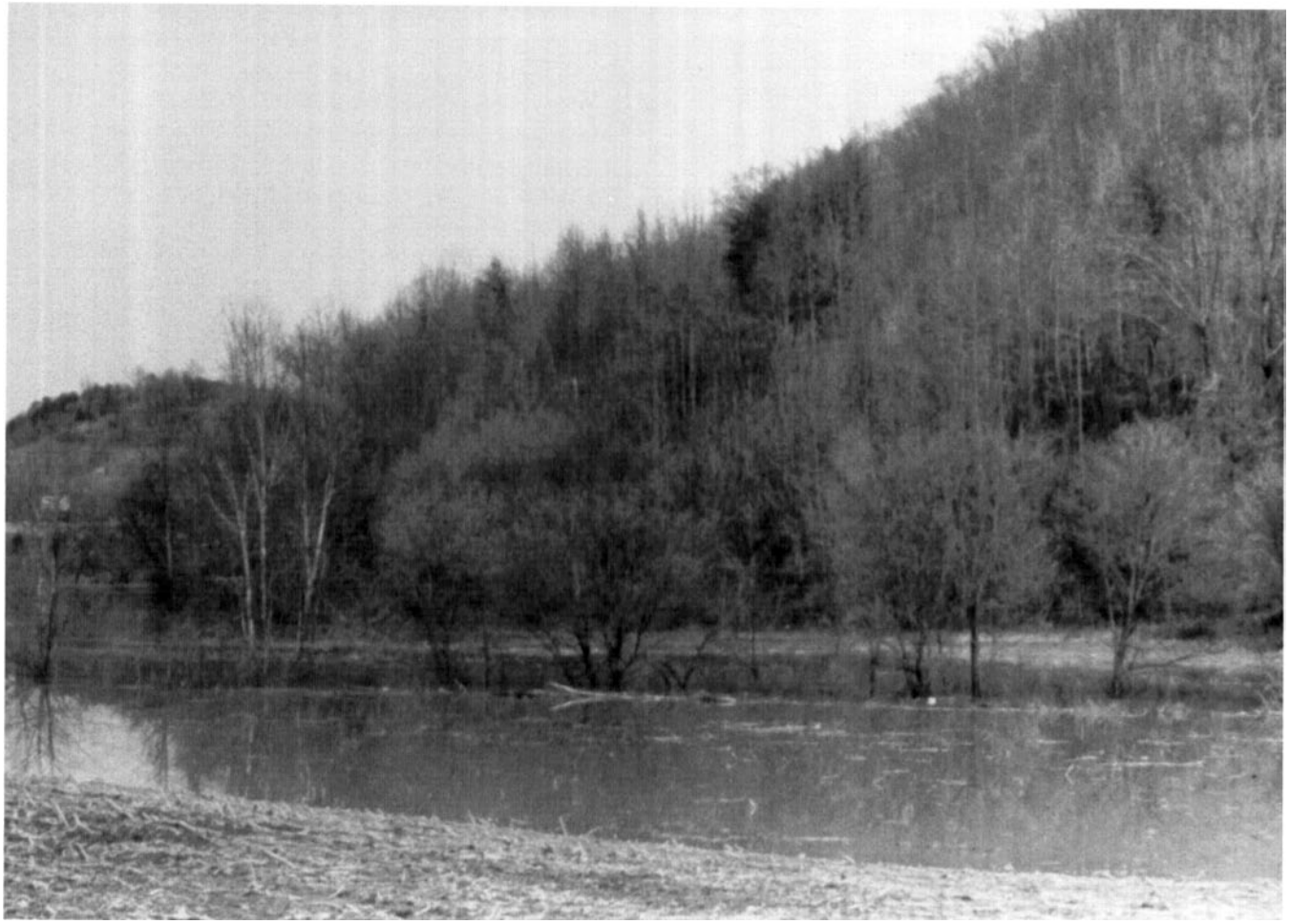


Figure 11.—An area of Grigsby fine sandy loam, frequently flooded. Flooding is a hazard along the flood plains in the survey area.

- See table 7 for specific information relating to the potential productivity of these soils.

Wildlife habitat

- The potential for woodland wildlife habitat is fair.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Field borders are good wildlife areas.
- Trees and brush along the streams are beneficial to wildlife and help to control erosion.
- Brush piles or other nesting sites are needed.

Urban development

- This soil is not suited to urban uses because of the frequent flooding.

Interpretive Group

Land capability classification: IIw

HaC—Hayter-Grigsby complex, 2 to 15 percent slopes

Setting

Landform: Stream terraces and flood plains
Shape of areas: Linear
Size of areas: 5 to 250 acres

Composition

Hayter soil and similar soils: 45 percent
Grigsby soil and similar soils: 35 percent
Contrasting components of minor extent: 20 percent

Minor Contrasting Components

- Orrville, Holly, and Chagrin soils on similar flood plains
- Soils that are moderately well drained on flood plains

- Allegheny, Cotaco, and Shelocta soils on similar stream terraces and colluvial fans
- Soils that are fine-loamy and have dark surface layers, on stream terraces
- Soils that are fine, have dark surface layers, and are moderately well drained
- Nelse soils on banks of major streams and rivers

Typical Profile

Hayter

Surface layer:
0 to 10 inches—dark brown loam

Subsoil:
10 to 21 inches—dark yellowish brown loam
21 to 46 inches—yellowish brown mottled loam
46 to 70 inches—dark yellowish brown mottled channery clay loam
70 to 80 inches-–dark yellowish brown mottled very channery clay loam

Grigsby

Surface layer:
0 to 11 inches—brown fine sandy loam

Subsoil:
11 to 19 inches—brown sandy loam
19 to 32 inches—dark yellowish brown fine sandy loam
32 to 54 inches—yellowish brown fine sandy loam
54 to 64 inches—dark yellowish brown fine sandy loam

Substratum:
64 to 80 inches—yellowish brown mottled loam and sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Natural fertility: Hayter—high; Grigsby—medium
Organic matter content: Low or moderate
Permeability: Hayter—moderately rapid; Grigsby—moderate or moderately rapid
Available water capacity: Hayter—low or moderate; Grigsby—moderate or high
Depth to root zone: Very deep
Surface runoff: Low or very low
Water table (depth, months): Hayter—at a depth of more than 6 feet; Grigsby—3.5 to 6 feet from January through April
Flooding (frequency, months): Hayter—rare flooding from December through May; Grigsby—frequent flooding from December through May

Use and Management

Cropland

- Most areas of these soils are suited to the production of row crops, such as corn, tobacco, and garden plots.
- Frequent flooding on the flood plains may limit production during certain years.
- The slope and erosion hazard are management concerns in the steeper areas of the stream terraces and colluvial fans.
- Conservation tillage, establishing and maintaining grass waterways within areas of concentrated water-flow patterns, contour farming, and crop residue management can be used to reduce the hazard of erosion.
- Conservation tillage, the use of cover crops, and applications of lime and fertilizer help to maintain soil tilth and fertility and prevent erosion.

Pasture and hayland

- Most areas of these soils are used for the production of pasture and hay.
- These soils are well suited to hay and pasture.
- Frequent flooding, a seasonal high water table, the slope, and the erosion hazard may limit hay and forage production.
- Flood-tolerant grass and legume species should be selected for planting in order to provide ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland

- These soils are suited to woodland production, and yields are generally high.
- Plant competition is the main limitation.
- Reforestation must be managed carefully to reduce undesirable plant competition.
- Northern red oak, yellow-poplar, white oak, white ash, sweetgum, black walnut, eastern white pine, and red maple are some of the native trees.
- Some trees preferred for planting on these soils are eastern white pine, black walnut, white ash, shortleaf pine, northern red oak, white oak, and yellow-poplar.
- See table 7 for specific information relating to the potential productivity of these soils.

Wildlife habitat
- The potential for openland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Field borders are good wildlife areas.
- Trees and brush along the streams are beneficial to wildlife and help to control erosion.
- Brush piles or other nesting sites are needed.

Urban development
- These soils have varying suitability for urban uses.
- The lower-lying Grigsby soil is not suited to urban uses because of the flooding.
- The Hayter soil is suited to most urban uses.
- The slope, depth to bedrock, and flooding are the main limitations affecting urban uses in areas of the Hayter soil. These limitations, however, may be overcome by sound engineering practices.

Interpretive Group

Land capability classification: Hayter—IIIe; Grigsby—IIw

HnF—Hazleton-Shelocta-Fedscreek complex, 30 to 80 percent slopes, very stony

Setting

Landform: Mountains
Shape of areas: Linear with a dendritic drainage pattern
Size of areas: 50 to 1,500 acres

Composition

Hazleton soil and similar soils: 45 percent
Shelocta soil and similar soils: 30 percent
Fedscreek soil and similar soils: 20 percent
Contrasting components of minor extent: 5 percent

Minor Contrasting Components

- Beech, Cloverlick, Fedscreek, Rigley, Shelocta, and Vandalia soils in similar landform positions
- Fairpoint, Fiveblock, and Kaymine soils in surface mined areas

Typical Profile

Hazleton
Surface layer:
0 to 3 inches—very dark grayish brown very channery sandy loam

Subsoil:
3 to 8 inches—light yellowish brown channery sandy loam
8 to 41 inches—brownish yellow extremely channery sandy loam
41 to 80 inches—yellowish brown extremely channery sandy loam

Shelocta
Surface layer:
0 to 3 inches—brown silt loam

Subsoil:
3 to 7 inches—yellowish brown silt loam
7 to 15 inches—dark yellowish brown silt loam
15 to 39 inches—strong brown channery silt loam
39 to 51 inches—strong brown very channery silt loam

Bedrock:
51 to 61 inches—fractured siltstone that can be excavated with difficulty

Fedscreek
Surface layer:
0 to 4 inches—very dark gray fine sandy loam

Subsoil:
4 to 11 inches—yellowish brown channery sandy loam
11 to 20 inches—yellowish brown channery sandy loam
20 to 74 inches—strong brown mottled channery sandy loam

Substratum:
74 to 82 inches—yellowish brown mottled very channery loam

Soil Properties and Qualities

Depth class: Hazleton and Fedscreek—very deep; Shelocta—deep
Drainage class: Well drained
Natural fertility: Hazleton and Fedscreek—low; Shelocta—medium
Organic matter content: Hazleton—moderate; Shelocta and Fedscreek—low to high
Permeability: Hazleton—moderately rapid or rapid; Shelocta—moderate; Fedscreek—moderately rapid
Available water capacity: Hazleton—low; Shelocta and Fedscreek—moderate or high
Depth to root zone: Hazleton and Fedscreek—very deep; Shelocta—deep
Surface runoff: Hazleton—medium or low; Shelocta—high; Fedscreek—medium
Depth to water table: More than 6 feet
Flooding: None

Use and Management

Cropland
- These soils are not suited to the production of row crops because of the slope, the hazard of erosion, and surface stones.

Pasture and hayland
- These soils are not suited to hay or pasture because of the slope, the hazard of erosion, and surface stones.
- Several areas adjacent to the flood plains, however, have been cleared and are used for unimproved pasture.

Woodland
- These soils are used mainly for woodland production and are currently in second-growth hardwoods.
- Northern red oak, scarlet oak, chestnut oak, American beech, blackgum, white oak, black oak, hickory, American beech, yellow-poplar, red maple, and Virginia pine are some of the native trees.
- Some trees preferred for planting on these soils are white oak, shortleaf pine, and eastern white pine.
- See table 7 for specific information relating to the potential productivity of these soils.
- The main concerns in managing timber are the hazard of erosion, equipment limitations, seedling mortality, and plant competition.
- Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, culverts, and/or vegetative cover.
- The slope, surface stones, and rock outcrops restrict the use of wheeled and tracked equipment on skid trails.
- Cable skidding is safer and disturbs the soil less than other harvesting methods.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for woodland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Brushy thickets can be established by clearing small areas in large tracts of mature woodland.
- Food plots or areas of green browse can be established along logging roads and skid trails.
- The habitat in areas of native plants can be improved by disking and applying lime and fertilizer.
- Den trees should not be harvested.
- Brush piles or other nesting sites are needed.

Urban development
- These soils are not suited to urban uses because of the slope, surface stones, and rock outcrops.

Interpretive Group

Land capability classification: VIIe

Ho—Holly silt loam, frequently flooded

Setting

Landform: Flood plains
Slope range: 0 to 2 percent
Shape of areas: Linear
Size of areas: 5 to 10 acres

Composition

Holly soil and similar soils: 90 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Chagrin, Grigsby, and Orrville soils in landform positions similar to those of the Holly soil
- Soils that are moderately well drained
- Allegheny and Cotaco soils on stream and river terraces
- Hayter soils on stream terraces and colluvial fans
- Nelse soils on banks of major streams and rivers

Typical Profile

Surface layer:
0 to 9 inches—dark gray mottled silt loam

Subsoil:
9 to 20 inches—gray mottled silt loam

Substratum:
20 to 47 inches—light brownish gray mottled loam
47 to 61 inches—light brownish gray mottled silt loam
61 to 80 inches—gray mottled silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Poorly drained
Natural fertility: Medium
Organic matter content: Moderate or high
Permeability: Moderately slow to moderately rapid
Available water capacity: Moderate or high
Depth to root zone: Very deep
Surface runoff: Ponded
Water table (depth, months): 0 to 1 foot; December through May
Flooding (frequency, months): Frequent; November through May

Use and Management

Cropland
- Most areas of this soil are suited to the production of row crops, such as corn, tobacco, and garden plots.
- Frequent flooding and a seasonal high water table may limit production during certain years.

Pasture and hayland
- Most areas of this soil are used for the production of pasture and hay.
- Frequent flooding and a seasonal high water table may limit hay and forage production during certain years.
- Flood-tolerant grass and legume species should be selected for planting in order to provide ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- This soil is suited to woodland production, and yields are generally high.
- Equipment limitations, seedling mortality, and plant competition are the main limitations.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.
- Pin oak, swamp white oak, red maple, green ash, black cherry, and eastern cottonwood are some of the native trees.
- Some trees preferred for planting on this soil are red maple, sweetgum, eastern cottonwood, green ash, American sycamore, pin oak, swamp white oak, silver maple, and baldcypress.
- See table 7 for specific information relating to the potential productivity of this soil.

Wildlife habitat
- The potential for openland wildlife habitat is fair.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Field borders are good wildlife areas.
- Trees and brush along the streams are beneficial to wildlife and help to control erosion.
- Brush piles or other nesting sites are needed.

Urban development
- This soil is not suited to urban uses because of the frequent flooding and a seasonal high water table.

Interpretive Group

Land capability classification: IIIw

MaF—Marrowbone-Blairton-Dekalb complex, 25 to 60 percent slopes, rocky

Setting

Landform: Mountains
Shape of areas: Convex-linear
Size of areas: 5 to 1,500 acres

Composition

Marrowbone soil and similar soils: 50 percent
Blairton soil and similar soils: 20 percent
Dekalb soil and similar soils: 20 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Cruze, Rarden, Upshur, and Rayne soils in landform positions similar to those of the major soils
- Fairpoint, Fiveblock, and Kaymine soils in surface mined areas
- Areas of rock outcrop

Typical Profile

Marrowbone
Surface layer:
0 to 4 inches—brown sandy loam

Subsoil:
4 to 10 inches—light yellowish brown channery sandy loam
10 to 23 inches—brownish yellow channery sandy loam
23 to 35 inches—yellowish brown channery sandy loam

Bedrock:
35 to 40 inches—highly weathered sandstone that can be excavated with difficulty
40 inches—sandstone

Blairton
Surface layer:
0 to 5 inches—brown silt loam

Subsoil:
5 to 15 inches—strong brown silt loam
15 to 23 inches—strong brown mottled channery silt loam

Transitional layer:
23 to 37 inches—light brownish gray mottled very channery silt loam

Bedrock:
37 to 47 inches—rippable shale that can be excavated

Dekalb
Surface layer:
0 to 4 inches—dark grayish brown very channery sandy loam

Subsoil:
4 to 24 inches—light yellowish brown extremely channery sandy loam

Bedrock:
24 to 28 inches—fractured sandstone that can be excavated
28 inches—hard sandstone

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Marrowbone—well drained; Blairton—moderately well drained; Dekalb—excessively drained
Natural fertility: Marrowbone—very low or low; Blairton—medium; Dekalb—low
Organic matter content: Marrowbone—low to high; Blairton—low or moderate; Dekalb—moderate or high
Permeability: Marrowbone—moderate or moderately rapid; Blairton—moderately slow; Dekalb—rapid
Available water capacity: Marrowbone—very low or low; Blairton—low; Dekalb—very low
Depth to root zone: Moderately deep
Surface runoff: Marrowbone—medium to very high; Blairton—very high; Dekalb—low
Water table (depth, months): Marrowbone and Dekalb—at a depth of more than 6 feet; Blairton—1 to 2.5 feet from November through March
Flooding: None

Use and Management

Cropland
- These soils are not suited to the production of row crops because of the slope, the hazard of erosion, surface stones, and rock outcrops.

Pasture and hayland
- These soils are not suited to hay or pasture because of the slope, the hazard of erosion, surface stones, and rock outcrops.
- Several areas have been cleared, however, and are used as unimproved pasture.

Woodland
- These soils are used mainly for woodland production and are currently in second-growth hardwoods.
- White oak, American beech, white ash, yellow-poplar, black oak, red maple, and hickory are some of the native trees.
- Some trees preferred for planting on these soils are white oak, shortleaf pine, yellow-poplar, white ash, and eastern white pine.
- See table 7 for specific information relating to the potential productivity of these soils.
- The main concerns in managing timber are the hazard of erosion, equipment limitations, seedling mortality, and plant competition.
- Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, culverts, and/or vegetative cover.
- The slope, surface stones, and rock outcrops restrict the use of wheeled and tracked equipment on skid trails.
- Cable skidding is safer and disturbs the soil less than other harvesting methods.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for woodland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Brushy thickets can be established by clearing small areas in large tracts of mature woodland.
- Food plots or areas of green browse can be established along logging roads and skid trails.
- The habitat in areas of native plants can be improved by disking and applying lime and fertilizer.
- Den trees should not be harvested.
- Brush piles or other nesting sites are needed.

Urban development
- These soils are not suited to urban uses because of the slope, surface stones, rock outcrops, and a seasonal high water table in areas of the Blairton soil.

Interpretive Group

Land capability classification: VIIe

NeD—Nelse fine sandy loam, 4 to 25 percent slopes, frequently flooded

Setting

Landform: Flood plains
Shape of areas: Long and narrow
Size of areas: 5 to 1,500 acres

Composition

Nelse soil and similar soils: 90 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Allegheny and Cotaco soils on stream and river terraces
- Hayter soils on stream terraces and colluvial fans
- Chagrin, Grigsby, Holly, and Orrville soils on flood plains

Typical Profile

Surface layer:
0 to 12 inches—very dark grayish brown fine sandy loam

Substratum:
12 to 20 inches—stratified dark brown, dark grayish brown, and yellowish brown fine sandy loam and sandy loam
20 to 32 inches—stratified dark brown and dark grayish brown fine sandy loam
32 to 44 inches—stratified very dark grayish brown and dark brown mottled loam and fine sandy loam
44 to 55 inches—stratified very dark grayish brown and dark brown mottled fine sandy loam and sandy loam
55 to 80 inches—stratified very dark grayish brown and yellowish brown mottled fine sandy loam and sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: High
Permeability: Moderately rapid or rapid
Available water capacity: Low
Depth to root zone: Very deep
Surface runoff: Very low to medium
Water table (depth, months): 4 to 6 feet; February and March
Flooding (frequency, months): Frequent; January through December

Use and Management

Cropland
- This soil is poorly suited to the production of row crops because of the slope and frequent flooding.

Pasture and hayland
- This soil is poorly suited to pasture and hay because of the slope and frequent flooding.

Woodland
- This soil is suited to woodland production.
- Boxelder, sweetgum, silver maple, black willow, river birch, green ash, and American sycamore are native trees.
- Some trees preferred for planting on this soil are green ash, American sycamore, and sweetgum.
- See table 7 for specific information relating to the potential productivity of this soil.
- The main concerns in managing timber are equipment limitations, seedling mortality, and plant competition.
- Equipment restrictions and seedling mortality are management concerns in areas that are subject to flooding.
- Plant competition inhibits reforestation unless it is controlled with intensive site preparation and maintenance.

Wildlife habitat
- The potential for woodland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Brushy thickets can be established by clearing small areas in large tracts of mature woodland.
- Food plots or areas of green browse can be established.
- The habitat in areas of native plants can be improved by disking and applying lime and fertilizer.
- Den trees should not be harvested.
- Brush piles or other nesting sites are needed.

Urban development
- This soil is not suited to urban uses because of the frequent flooding and the slope.

Interpretive Group

Land capability classification: IVe

Or—Orrville silt loam, frequently flooded

Setting

Landform: Flood plains
Slope range: 0 to 2 percent
Shape of areas: Linear
Size of areas: 5 to 20 acres

Composition

Orrville soil and similar soils: 90 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Chagrin, Grigsby, and Holly soils in landform positions similar to those of the Orrville soil
- Soils that are moderately well drained
- Allegheny and Cotaco soils on stream and river terraces
- Hayter soils on stream terraces and colluvial fans
- Nelse soils on banks of major streams and rivers

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown silt loam

Subsoil:
10 to 16 inches—pale brown mottled silt loam
16 to 30 inches—grayish brown mottled silt loam

Substratum:
30 to 46 inches—light brownish gray mottled clay loam
46 to 65 inches—light gray mottled clay loam
65 to 80 inches—strong brown mottled clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Natural fertility: Medium
Organic matter content: Moderate
Permeability: Moderate or moderately rapid
Available water capacity: Moderate or high
Depth to root zone: Very deep
Surface runoff: Negligable to low
Water table (depth, months): 1 to 2.5 feet; November through June
Flooding (frequency, months): Frequent; November through May

Use and Management

Cropland
- Most areas of this soil are suited to the production of row crops, such as corn, tobacco, and garden plots.
- The frequent flooding and a seasonal high water table may limit production during certain years.

Pasture and hayland
- Most areas of this soil are used for the production of pasture and hay.
- This soil is suited to hay and pasture.
- Frequent flooding and a seasonal high water table may limit hay and forage production during certain years.
- Flood-tolerant grass and legume species should be selected for planting in order to provide ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- This soil is suited to woodland production, and yields are generally high.
- Equipment limitations, seedling mortality, and plant competition are the main limitations.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.
- Northern red oak, pin oak, yellow-poplar, white oak, black cherry, white ash, black walnut, and sugar maple are some of the native trees.
- Some trees preferred for planting on this soil are eastern white pine, white ash, Scotch pine, black cherry, black locust, American sycamore, northern red oak, white oak, and yellow-poplar.
- See table 7 for specific information relating to the potential productivity of these soils.

Wildlife habitat
- The potential for openland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Field borders are good wildlife areas.
- Trees and brush along the streams are beneficial to wildlife and help to control erosion.
- Brush piles or other nesting sites are needed.

Urban development
- This soil is not suited to urban uses because of the frequent flooding and a seasonal high water table.

Interpretive Group

Land capability classification: IIw

RaF—Rayne-Marrowbone-Dekalb complex, 20 to 80 percent slopes, very rocky

Setting

Landform: Mountains
Shape of areas: Convex-linear
Size of areas: 5 to 1,500 acres

Composition

Rayne soil and similar soils: 35 percent
Marrowbone soil and similar soils: 35 percent

Dekalb soil and similar soils: 20 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Blairton, Cruze, Rarden, and Upshur soils in landform positions similar to those of the major soils
- Fairpoint, Fiveblock, and Kaymine soils in surface mined areas
- Areas of rock outcrop

Typical Profile

Rayne

Surface layer:
0 to 3 inches—dark grayish brown loam

Transitional layer:
3 to 11 inches—yellowish brown silt loam

Subsoil:
11 to 20 inches—strong brown channery silty clay loam
20 to 37 inches—strong brown mottled silty clay loam

Substratum:
37 to 49 inches—strong brown mottled very channery silty clay loam

Bedrock:
49 to 59 inches—highly weathered siltstone than can be excavated

Marrowbone

Surface layer:
0 to 4 inches—brown sandy loam

Subsoil:
4 to 10 inches—light yellowish brown channery sandy loam
10 to 23 inches—brownish yellow channery sandy loam
23 to 35 inches—yellowish brown channery sandy loam

Bedrock:
35 to 40 inches—highly weathered sandstone that can be excavated with difficulty
40 inches—sandstone

Dekalb

Surface layer:
0 to 4 inches—dark grayish brown very channery sandy loam

Subsoil:
4 to 13 inches—light yellowish brown extremely channery sandy loam
13 to 24 inches—light yellowish brown extremely channery sandy loam

Bedrock:
24 to 28 inches—fractured sandstone that can be excavated
28 inches—hard sandstone

Soil Properties and Qualities

Depth class: Rayne—deep; Marrowbone and Dekalb—moderately deep
Drainage class: Rayen and Marrowbone—well drained; Dekalb—excessively drained
Natural fertility: Rayne—medium; Marrowbone—very low or low; Dekalb—low
Organic matter content: Rayne—low or moderate; Marrowbone—low to high; Dekalb—moderate or high
Permeability: Rayne—moderate; Marrowbone—moderate or moderately rapid; Dekalb—rapid
Available water capacity: Rayne—moderate; Marrowbone—very low or low; Dekalb—very low
Depth to root zone: Rayne—deep; Marrowbone and Dekalb—moderately deep
Surface runoff: Rayne—high; Marrowbone—medium to very high; Dekalb—low
Depth to water table: More than 6 feet
Flooding: None

Use and Management

Cropland

- These soils are not suited to the production of row crops because of the slope, the hazard of erosion, surface stones, and rock outcrops.

Pasture and hayland

- These soils are not suited to hay or pasture because of the slope, the hazard of erosion, surface stones, and rock outcrops.
- Several areas have been cleared, however, and are used as unimproved pasture.

Woodland

- These soils are used mainly for woodland production and are currently in second-growth hardwoods.
- Northern red oak, sweet birch, shortleaf pine, eastern white pine, chestnut oak, white oak, black oak, hickory, American beech, yellow-poplar, red maple, and Virginia pine are some of the native trees.
- Some trees preferred for planting on these soils are white oak, northern red oak, ash, shortleaf pine, eastern white pine, and yellow-poplar.
- See table 7 for specific information relating to the potential productivity of these soils.
- The main concerns in managing timber are the

hazard of erosion, equipment limitations, seedling mortality, and plant competition.
- Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, culverts, and/or vegetative cover.
- The slope, surface stones, and rock outcrops restrict the use of wheeled and tracked equipment on skid trails.
- Cable skidding is safer and disturbs the soil less than other harvesting methods.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for woodland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Brushy thickets can be established by clearing small areas in large tracts of mature woodland.
- Food plots or areas of green browse can be established along logging roads and skid trails.
- The habitat in areas of native plants can be improved by disking and applying lime and fertilizer.
- Den trees should not be harvested.
- Brush piles or other nesting sites are needed.

Urban development
- These soils are not suited to urban uses because of the slope, depth to bedrock, surface stones, and rock outcrops.

Interpretive Group

Land capability classification: VIIe

RoF—Rigley-Rock outcrop complex, 30 to 70 percent slopes

Setting

Landform: Mountains
Shape of areas: Linear
Size of areas: 5 to 150 acres

Composition

Rigley soil and similar soils: 50 percent
Rock outcrop: 40 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Fedscreek, Hazleton, and Shelocta soils in similar landform positions

Typical Profile

Rigley
Surface layer:
0 to 6 inches—brown fine sandy loam

Transitional layer:
6 to 11 inches—yellowish brown sandy loam

Subsoil:
11 to 21 inches—yellowish brown sandy loam
21 to 42 inches—strong brown sandy loam
42 to 53 inches—yellowish brown sandy loam

Transitional layer:
53 to 60 inches—yellowish brown mottled sandy loam

Substratum:
60 to 80 inches—yellowish brown sandy loam

Rock outcrop

The Rock outcrop consists of light gray, fine- to very coarse-grained sandstone that is pebbly at the base of beds and quartzose. It is massive, commonly cross bedded, and very resistant to weathering.

Properties and Qualities of the Rigley Soil

Depth class: Very deep
Drainage class: Well drained
Natural fertility: Low
Organic matter content: Low or moderate
Permeability: Moderately rapid
Available water capacity: Moderate
Depth to root zone: Very deep
Surface runoff: Medium
Depth to water table: More than 6 feet
Flooding: None

Use and Management

Cropland
- This map unit is not suited to the production of row crops because of the slope, the hazard of erosion, surface stones, and the Rock outcrop.

Pasture and hayland
- This map unit is not suited to hay or pasture because of the slope, the hazard of erosion, surface stones, and the Rock outcrop.

Woodland
- This map unit is used mainly for woodland production and is currently in second-growth hardwoods.
- White oak, black oak, northern red oak, yellow-poplar, American beech, and hickory are some of the native trees.
- Some trees preferred for planting in this map unit

are white oak, northern red oak, yellow-poplar, eastern white pine, and shortleaf pine.
- See table 7 for specific information relating to the potential productivity of this map unit.
- The main concerns in managing timber are the hazard of erosion, equipment limitations, and plant competition.
- Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, culverts, and/or vegetative cover.
- The slope, surface stones, and the Rock outcrop restrict the use of wheeled and tracked equipment on skid trails.
- Cable skidding is safer and disturbs the soil less than other harvesting methods.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for woodland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Brushy thickets can be established by clearing small areas in large tracts of mature woodland.
- Food plots or areas of green browse can be established along logging roads and skid trails.
- The habitat in areas of native plants can be improved by disking and applying lime and fertilizer.
- Den trees should not be harvested.
- Brush piles or other nesting sites are needed.

Urban development
- This map unit is not suited to urban uses because of the slope, surface stones, and the Rock outcrop.

Interpretive Group

Land capability classification: Rigley—VIIe; Rock outcrop—VIIIs

SeE—Shelocta silt loam, 12 to 30 percent slopes

Setting

Landform: Mountains
Shape of areas: Irregular
Size of areas: 5 to 35 acres

Composition

Shelocta soil and similar soils: 90 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components
- Beech, Cloverlick, Fedscreek, Hazleton, Rigley, and Vandalia soils in landform positions similar to those of the Shelocta soil
- Fiveblock, Fairpoint, and Kaymine soils in surface mined areas

Typical Profile

Surface layer:
0 to 3 inches—brown silt loam

Subsoil:
3 to 7 inches—yellowish brown silt loam
7 to 15 inches—dark yellowish brown silt loam
15 to 39 inches—strong brown channery silt loam
39 to 51 inches—strong brown very channery silt loam

Bedrock:
51 to 61 inches—fractured siltstone that can be excavated with difficulty

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Natural fertility: Medium
Organic matter content: Low to high
Permeability: Moderate
Available water capacity: Moderate or high
Depth to root zone: Deep
Surface runoff: Medium or high
Depth to water table: More than 6 feet
Flooding: None

Use and Management

Cropland
- This soil is poorly suited to the production of row crops because of the slope and the hazard of erosion.

Pasture and hayland
- This soil is used mainly for the production of pasture and hay.
- The slope and the hazard of erosion may limit hay or forage production in certain areas.
- Long-enduring, drought-tolerant grass and legume species should be selected for planting in order to provide adequate ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed

preparation, the use of good-quality seed, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- This soil is suited to woodland production, and yields are generally high.
- White oak, black oak, scarlet oak, chestnut oak, hickory, American beech, yellow-poplar, red maple, and Virginia pine are some of the native trees.
- Some trees preferred for planting on this soil are white oak, northern red oak, white ash, black walnut, shortleaf pine, eastern white pine, and yellow-poplar.
- See table 7 for specific information relating to the potential productivity of this soil.
- The main concerns in managing timber are the hazard of erosion, equipment limitations, and plant competition.
- Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, culverts, and/or vegetative cover.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for woodland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Brushy thickets can be established by clearing small areas in large tracts of mature woodland.
- Food plots or areas of green browse can be established along logging roads and skid trails.
- The habitat in areas of native plants can be improved by disking and applying lime and fertilizer.
- Den trees should not be harvested.
- Brush piles or other nesting sites are needed.

Urban development
- This soil is poorly suited to urban uses because of the slope.
- The slope may be overcome by sound engineering practices.

Interpretive Group

Land capability classification: VIe

SgC—Shelocta-Grigsby-Orrville complex, 2 to 15 percent slopes

Setting

Landform: Mountains and flood plains
Shape of areas: Linear
Size of areas: 5 to 300 acres

Composition

Shelocta soil and similar soils: 40 percent
Grigsby soil and similar soils: 35 percent
Orrville soil and similar soils: 15 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Allegheny and Cotaco soils on stream and river terraces
- Chagrin and Holly soils on flood plains
- Nelse soils on banks of major streams and rivers
- Beech, Cloverlick, Fedscreek, Hazleton, Rigley, and Vandalia soils on side slopes
- Fairpoint, Fiveblock, and Kaymine soils in surface mined areas

Typical Profile

Shelocta
Surface layer:
0 to 3 inches—brown silt loam

Subsoil:
3 to 7 inches—yellowish brown silt loam
7 to 15 inches—dark yellowish brown silt loam
15 to 39 inches—strong brown channery silt loam
39 to 51 inches—strong brown very channery silt loam

Bedrock:
51 to 61 inches—fractured siltstone that can be excavated with difficulty

Grigsby
Surface layer:
0 to 11 inches—brown fine sandy loam

Subsoil:
11 to 19 inches—brown sandy loam
19 to 32 inches—dark yellowish brown fine sandy loam
32 to 54 inches—yellowish brown fine sandy loam
54 to 64 inches—dark yellowish brown fine sandy loam

Substratum:
64 to 80 inches—yellowish brown mottled loam and sandy loam

Orrville
Surface layer:
0 to 10 inches—dark grayish brown silt loam

Subsoil:
10 to 16 inches—brown mottled silt loam
16 to 30 inches—grayish brown mottled silt loam

Substratum:
30 to 46 inches—light brownish gray mottled clay loam
46 to 65 inches—light gray mottled clay loam
65 to 80 inches—strong brown mottled clay loam

Soil Properties and Qualities

Depth class: Shelocta—deep; Grigsby and Orrville—very deep
Drainage class: Shelocta and Grigsby—well drained; Orrville—somewhat poorly drained
Natural fertility: Medium
Organic matter content: Shelocta—low to high; Grigsby—low or moderate; Orrville—moderate
Permeability: Shelocta—moderate; Grigsby and Orrville—moderate or moderately rapid
Available water capacity: Shelocta and Orrville—moderate or high; Grigsby—moderate
Depth to root zone: Shelocta—deep; Grigsby and Orrville—very deep
Surface runoff: Shelocta—low or medium; Grigsby—low; Orrville—very low or low
Water table (depth, months): Shelocta—at a depth of more than 6 feet; Grigsby—3.5 to 6 feet from January through April; Orrville—1 to 2.5 feet from November through June
Flooding (frequency, months): Shelocta—none; Grigsby—frequent flooding from December through May; Orrville—frequent flooding from November through May

Use and Management

Cropland

- These soils are well suited to the production of row crops, such as corn, tobacco, and garden plots.
- The frequent flooding on the flood plains may limit production during certain years.
- The slope and erosion hazard are management concerns in the steeper areas of stream terraces and colluvial fans.
- Conservation tillage, establishing and maintaining grass waterways within areas of concentrated water-flow patterns, contour farming, and crop residue management can be used to reduce the hazard of erosion.
- Conservation tillage, the use of cover crops, and applications of lime and fertilizer help to maintain soil tilth and fertility and prevent erosion.

Pasture and hayland

- Most areas of these soils are used for the production of pasture and hay.
- These soils are well suited to hay and pasture.
- Frequent flooding, a seasonal high water table, and an erosion hazard may limit hay and forage production.
- Flood-tolerant grass and legume species should be selected for planting in order to provide ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland

- These soils are suited to woodland production, and yields are generally high.
- Northern red oak, yellow-poplar, American beech, shortleaf pine, red maple, scarlet oak, chestnut oak, American sycamore, sweetgum, hickory, white oak, black oak, white ash, black walnut, eastern white pine, and sugar maple are some of the native trees.
- Some trees preferred for planting on these soils are eastern white pine, shortleaf pine, white ash, Scotch pine, black locust, American sycamore, black walnut, northern red oak, white oak, and yellow-poplar.
- See table 7 for specific information relating to the potential productivity of these soils.
- The main concerns in managing timber are equipment limitations, seedling mortality, the hazard of erosion, and plant competition.
- Reforestation must be managed carefully to reduce undesirable plant competition.

Wildlife habitat

- The potential for openland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Field borders are good wildlife areas.
- Trees and brush along the streams are beneficial to wildlife and help to control erosion.
- Brush piles or other nesting sites are needed.

Urban development

- These soils have varying suitability for urban uses.
- The lower-lying Grigsby and Orrville soils are not suited to most urban uses because of the flooding.
- The Shelocta soil is poorly suited to most urban uses because of the slope.
- The soil limitations may be overcome by sound engineering practices.

Interpretive Group

Land capability classification: Shelocta—IIIe; Grigsby and Orrville—IIw

ShF—Shelocta-Hazleton-Fedscreek complex, 30 to 60 percent slopes, stony

Setting

Landform: Mountains
Shape of areas: Linear with a dendritic drainage pattern
Size of areas: 50 to 1,500 acres

Composition

Shelocta soil and similar soils: 40 percent
Hazleton soil and similar soils: 30 percent
Fedscreek soil and similar soils: 20 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Beech, Cloverlick, Rigley, and Vandalia soils in landform positions similar to those of the major soils
- Fairpoint, Fiveblock, and Kaymine soils in surface mined areas

Typical Profile

Shelocta
Surface layer:
0 to 3 inches—brown silt loam

Subsoil:
3 to 7 inches—yellowish brown silt loam
7 to 15 inches—dark yellowish brown silt loam
15 to 39 inches—strong brown channery silt loam
39 to 51 inches—strong brown very channery silt loam

Bedrock:
51 to 61 inches—fractured siltstone that can be excavated with difficulty

Hazleton
Surface layer:
0 to 3 inches—very dark grayish brown very channery sandy loam

Subsoil:
3 to 8 inches—light yellowish brown channery sandy loam
8 to 41 inches—brownish yellow extremely channery sandy loam
41 to 80 inches—yellowish brown extremely channery sandy loam

Fedscreek
Surface layer:
0 to 4 inches—very dark gray fine sandy loam

Subsoil:
4 to 11 inches—yellowish brown channery sandy loam
11 to 20 inches—yellowish brown channery sandy loam
20 to 74 inches—strong brown mottled channery sandy loam

Substratum:
74 to 82 inches—yellowish brown mottled very channery loam

Soil Properties and Qualities

Depth class: Shelocta—deep; Hazleton and Fedscreek—very deep
Drainage class: Well drained
Natural fertility: Shelocta—medium; Hazleton and Fedscreek—low
Organic matter content: Shelocta and Fedscreek—low to high; Hazleton—moderate
Permeability: Shelocta—moderate; Hazleton and Fedscreek—moderately rapid
Available water capacity: Shelocta and Fedscreek—moderate or high; Hazleton—low or moderate
Depth to root zone: Shelocta—deep; Hazleton and Fedscreek—very deep
Surface runoff: Shelocta—high; Hazleton—low or medium; Fedscreek—medium
Depth to water table: More than 6 feet
Flooding: None

Use and Management

Cropland
- These soils are not suited to the production of row crops because of the slope, the hazard of erosion, surface stones, and rock outcrops.

Pasture and hayland
- These soils are not suited to hay or pasture because of the slope, the hazard of erosion, surface stones, and rock outcrops.
- Several areas adjacent to the flood plains, however, have been cleared and are used as unimproved pasture.

Woodland
- These soils are used mainly for woodland production and are currently in second-growth hardwoods.
- Northern red oak, white oak, black oak, chestnut oak, scarlet oak, hickory, American beech, yellow-poplar, sugar maple, and Virginia pine are some of the native trees.
- Some trees preferred for planting on these soils are

white oak, northern red oak, shortleaf pine, eastern white pine, and yellow-poplar.
- See table 7 for specific information relating to the potential productivity of these soils.
- The main concerns in managing timber are the hazard of erosion, equipment limitations, seedling mortality, and plant competition.
- Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, culverts, and/or vegetative cover.
- The slope, surface stones, and rock outcrops restrict the use of wheeled and tracked equipment on skid trails.
- Cable skidding is safer and disturbs the soil less than other harvesting methods.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for woodland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Brushy thickets can be established by clearing small areas in large tracts of mature woodland.
- Food plots or areas of green browse can be established along logging roads and skid trails.
- The habitat in areas of native plants can be improved by disking and applying lime and fertilizer.
- Den trees should not be harvested.
- Brush piles or other nesting sites are needed.

Urban development
- These soils are not suited to urban uses because of the slope, surface stones, and rock outcrops.

Interpretive Group

Land capability classification: VIIe

UdC—Udorthents-Urban land complex, 0 to 12 percent slopes

Setting

Landform: Mountains
Shape of areas: Irregular
Size of areas: 5 to 250 acres

Composition

Note: Areas of Udorthents and Urban land in this map unit occur so close together that they could not be separated at the scale selected for mapping.
Udorthents and similar soils: 60 percent
Urban land: 30 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components
- Fairpoint, Fiveblock, and Kaymine soils in surface mined areas
- Beech, Cloverlick, Fedscreek, Hazleton, Shelocta, and Vandalia soils on side slopes
- Blairton, Cruze, Dekalb, Marrowbone, Rarden, Upshur, and Rayne soils on ridges
- Allegheny and Cotaco soils on stream and river terraces
- Hayter soils on stream terraces and colluvial fans
- Chagrin, Grigsby, Holly, and Orrville soils on flood plains
- Nelse soils on banks of major streams and rivers

Typical Profile

Udorthents

Udorthents consist of fill material composed of soil and rock that has been altered from its natural state for the purpose of road construction and building site development. They typically occur along major highways, streams, and industrial sites and around cities and towns in the survey area. The characteristics of Udorthents are extremely variable because the natural soil has been altered extensively by human activities. A typical pedon cannot be given.

Urban land

Urban land includes residences, industrial sites, commercial sites, parking lots, schools, cemeteries, airports, golf courses, landfills, and other permanent structures. This land has been permanently removed from the rural land base. Urban land typically occurs in and around towns and cities in the survey area. Because of the variability of the material in areas of Urban land, a typical pedon is not given.

Properties and Qualities of Udorthents

Depth class: Variable
Drainage class: Variable
Natural fertility: Variable
Organic matter content: Variable
Permeability: Variable
Available water capacity: Variable
Depth to root zone: Variable
Surface runoff: Variable
Depth to water table: Variable
Flooding: Variable

Use and Management

Cropland
- This map unit is poorly suited to the production of row crops because of the slope, the hazard of erosion, surface stones, and droughtiness.

Pasture and hayland
- Udorthents are poorly suited to hay or pasture.
- Most grasses and legumes grown in the survey area will grow on Udorthents.
- The slope, large stones and coarse fragments on the surface, slumping, and settling are the main limitations affecting pasture and hayland.
- Vegetative treatment that provides a quick and permanent cover helps to control erosion.
- In seeding areas of Udorthents, the soil material must be graded smooth so that equipment can be used without interference during planting, harvesting, and maintenance operations.
- Proper seedbed preparation, good-quality seed, mulch, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- Udorthents are suited to woodland.
- Eastern white pine, black locust, and autumn olive are trees commonly used for reclamation.
- Good-quality planting stock is required for maximum survival and growth.
- See table 7 for specific information relating to the potential productivity of this map unit.
- The main concerns in managing timber are the slope, equipment limitations, seedling mortality, and plant competition.
- Large stones and rock fragments restrict the use of equipment.

Wildlife habitat
- Areas that are graded, seeded, and planted with either herbaceous or woody plants have good potential for wildlife food and cover.
- Any planting that provides adequate vegetative cover and controls erosion is beneficial to wildlife.
- Contour strip planting of herbaceous plants and trees is more beneficial than solid plantings.

Urban development
- The nearly level to sloping areas of this map unit are well suited to urban development.
- The main limitations are differential settling and the hazard of erosion.
- The limitations may be overcome by sound engineering practices.

Interpretive Group

Land capability classification: None assigned

UdF—Udorthents-Urban land complex, 0 to 80 percent slopes, benched

Setting

Landform: Mountains
Shape of areas: Irregular
Size of areas: 5 to 250 acres

Composition

Note: Areas of Udorthents and Urban land in this map unit occur so close together that they could not be separated at the scale selected for mapping.
Udorthents and similar soils: 70 percent
Urban land: 20 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Fairpoint, Fiveblock, and Kaymine soils in surface mined areas
- Beech, Cloverlick, Fedscreek, Hazleton, Shelocta, and Vandalia soils on side slopes
- Blairton, Cruze, Dekalb, Marrowbone, Rarden, Upshur, and Rayne soils on ridges
- Allegheny and Cotaco soils on stream and river terraces
- Hayter soils on stream terraces and colluvial fans
- Chagrin, Grigsby, Holly, and Orrville soils on flood plains
- Nelse soils on banks of major streams and rivers

Typical Profile

Udorthents

Udorthents consist of fill material composed of soil and rock that has been altered from its natural state for the purpose of road construction and building site development. Udorthents typically occur along major highways, streams, and industrial sites and around cities and towns in the survey area. The characteristics of Udorthents are extremely variable because the natural soil has been altered extensively by human activities. A typical pedon cannot be given.

Urban land

Urban land includes residences, industrial sites, commercial sites, parking lots, schools, cemeteries, airports, golf courses, landfills, and other permanent structures. This land has been permanently removed form the rural land base. Urban land typically occurs in and around towns and cities in the survey area. Because of the variability of the material in areas of Urban land, a typical pedon is not given.

Properties and Qualities of Udorthents

Depth class: Variable
Drainage class: Variable
Natural fertility: Variable
Organic matter content: Variable
Permeability: Variable
Available water capacity: Variable
Depth to root zone: Variable
Surface runoff: Variable
Depth to water table: Variable
Flooding: Variable

Use and Management

Cropland
- This map unit is poorly suited to the production of row crops because of the slope, the hazard of erosion, surface stones, and droughtiness.

Pasture and hayland
- Udorthents are poorly suited to hay or pasture.
- Most grasses and legumes grown in the survey area will grow on Udorthents.
- The slope, large stones and coarse fragments on the surface, slumping, and settling are the main limitations.
- Vegetative treatment that provides a quick and permanent cover helps to control erosion.
- In seeding areas of Udorthents, the soil material must be graded smooth so that equipment can be used without interference during planting, harvesting, and maintenance operations.
- Proper seedbed preparation, good-quality seed, mulch, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- Udorthents are suited to woodland.
- Eastern white pine, black locust, and autumn olive are trees commonly used for reclamation.
- Good-quality planting stock is required for maximum survival and growth.
- See table 7 for specific information relating to the potential productivity of this map unit.
- The main concerns in managing timber are the slope, equipment limitations, seedling mortality, and plant competition.
- Large stones and rock fragments restrict the use of equipment.

Wildlife habitat
- Areas that are graded, seeded, and planted with either herbaceous or woody plants have good potential for wildlife food and cover.
- Any planting that provides adequate vegetative cover and controls erosion is beneficial to wildlife.
- Contour strip planting of herbaceous plants and trees is more beneficial than solid plantings.

Urban development
- Nearly level to sloping areas of this map unit are well suited to urban development.
- The main limitations are the slope, differential settling, and the hazard of erosion.
- The limitations may be overcome by sound engineering practices.

Interpretive Group

Land capability classification: None assigned

UpC—Upshur-Rarden complex, 6 to 12 percent slopes

Setting

Landform: Mountains
Shape of areas: Convex-linear
Size of areas: 5 to 20 acres

Composition

Upshur soil and similar soils: 50 percent
Rarden soil and similar soils: 30 percent
Contrasting components of minor extent: 20 percent

Minor Contrasting Components

- Blairton, Cruze, Dekalb, Marrowbone, and Rayne soils in landform positions similar to those of the Upshur and Rarden soils
- Soils that are clayey-skeletal
- Soils that have bedrock at a depth of more than 60 inches
- Soils that are somewhat poorly drained

Typical Profile

Upshur
Surface layer:
0 to 3 inches—brown silty clay loam

Subsoil:
3 to 7 inches—dark reddish brown clay
7 to 18 inches—dark reddish brown silty clay
18 to 30 inches—dark reddish brown mottled silty clay

Transitional layer:
30 to 42 inches—dusky red mottled very channery silty clay loam

Substratum:
42 to 52 inches—dusky red mottled extremely channery silty clay loam

Bedrock:
52 to 62 inches—siltstone that can be excavated with difficultly

Rarden
Surface layer:
0 to 3 inches—brown silt loam

Subsoil:
3 to 19 inches—dark reddish brown mottled silty clay
19 to 26 inches—yellowish red and light gray silty clay

Bedrock:
26 to 36 inches—siltstone that can be excavated with difficulty

Soil Properties and Qualities

Depth class: Upshur—deep; Rarden—moderately deep
Drainage class: Upshur—well drained; Rarden—moderately well drained
Natural fertility: High
Organic matter content: Low or moderate
Permeability: Slow
Available water capacity: Upshur—low or moderate; Rarden—low
Depth to root zone: Upshur—deep; Rarden—moderately deep
Surface runoff: High or very high
Water table (depth, months): Upshur—at a depth of more than 6 feet; Rarden—1.5 to 3 feet from January through April
Flooding: None

Use and Management

Cropland
- These soils are suited to the production of row crops, such as corn, tobacco, and garden plots.
- Soil management concerns include keeping erosion to a minimum, maintaining tilth and fertility, and overcoming the droughtiness.
- Conservation tillage, establishing and maintaining grass waterways within areas of concentrated water-flow patterns, contour farming, and managing crop residue can be used to reduce the hazard of erosion.
- Conservation tillage, the use of cover crops, and applications of lime and fertilizer help to maintain soil tilth and fertility and prevent erosion.

Pasture and hayland
- These soils are used mainly for the production of pasture and hay.
- These soils are well suited to hay and pasture.
- The slope, erosion hazard, droughtiness, a seasonal high water table, and depth of the root zone may limit hay and forage production in certain areas.
- Long-enduring, drought-tolerant grass and legume species should be selected for planting in order to provide ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- These soils are suited to woodland production and are currently in second-growth hardwoods.
- Northern red oak, black oak, white ash, red maple, eastern white pine, yellow-poplar, and Virginia pine are some of the native trees.
- Some trees preferred for planting on these soils are eastern white pine, green ash, pin oak, red maple, Virginia pine, shortleaf pine, and yellow-poplar.
- See table 7 for specific information relating to the potential productivity of these soils.
- The main concerns in managing timber are the hazard of erosion, seedling mortality, plant competition, and low strength.
- Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, culverts, and/or vegetative cover.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for woodland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Brushy thickets can be established by clearing small areas in large tracts of mature woodland.
- Food plots or areas of green browse can be established along logging roads and skid trails.
- The habitat in areas of native plants can be improved by disking and applying lime and fertilizer.
- Den trees should not be harvested.
- Brush piles or other nesting sites are needed.

Urban development
- These soils are poorly suited to urban uses because of a seasonal high water table and the shrink-swell potential.
- The soil limitations may be overcome by sound engineering practices.

Interpretive Group

Land capability classification: IVe

UpD—Upshur-Rarden complex, 12 to 25 percent slopes

Setting

Landform: Mountains
Shape of areas: Convex-linear
Size of areas: 5 to 1,500 acres

Composition

Upshur soil and similar soils: 50 percent
Rarden soil and similar soils: 30 percent
Contrasting components of minor extent: 20 percent

Minor Contrasting Components

- Blairton, Cruze, Dekalb, Marrowbone, and Rayne soils in landform positions similar to those of the Upshur and Rarden soils
- Soils that are clayey-skeletal
- Soils that have bedrock at a depth of more than 60 inches
- Soils that are somewhat poorly drained

Typical Profile

Upshur
Surface layer:
0 to 3 inches—brown silty clay loam

Subsoil:
3 to 7 inches—dark reddish brown clay
7 to 18 inches—dark reddish brown silty clay
18 to 30 inches—dark reddish brown mottled silty clay

Transitional layer:
30 to 42 inches—dusky red mottled very channery silty clay loam

Substratum:
42 to 52 inches—dusky red mottled extremely channery silty clay loam

Bedrock:
52 to 62 inches—siltstone that can be excavated with difficultly

Rarden
Surface layer:
0 to 3 inches—brown silt loam

Subsoil:
3 to 19 inches—dark reddish brown mottled silty clay
19 to 26 inches—yellowish red and light gray silty clay

Bedrock:
26 to 36 inches—siltstone that can be excavated with difficulty

Soil Properties and Qualities

Depth class: Upshur—deep; Rarden—moderately deep
Drainage class: Upshur—well drained; Rarden—moderately well drained
Natural fertility: High
Organic matter content: Low or moderate
Permeability: Slow
Available water capacity: Upshur—low or moderate; Rarden—low
Depth to root zone: Upshur—deep; Rarden—moderately deep
Surface runoff: Very high
Water table (depth, months): Upshur—at a depth of more than 6 feet; Rarden—1.5 to 3 feet from January through April
Flooding: None

Use and Management

Cropland
- These soils are poorly suited to the production of row crops because of the slope and the hazard of erosion.

Pasture and hayland
- These soils are used mainly for the production of pasture and hay.
- These soils are well suited to hay and pasture.
- The slope, erosion hazard, droughtiness, a seasonal high water table, and depth of the root zone may limit hay and forage production in certain areas.
- Long-enduring, drought-tolerant grass and legume species should be selected for planting in order to provide ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.
- Proper species selection, proper seedbed preparation, the use of good-quality seed, and adequate applications of lime and fertilizer are necessary to produce quality stands.

Woodland
- These soils are suited to woodland production and are currently in second-growth hardwoods.
- Northern red oak, yellow-poplar, white ash, black cherry, red maple, eastern white pine, and Virginia pine are some of the native trees.
- Some trees preferred for planting on these soils are eastern white pine, eastern redcedar, green ash, pin oak, red maple, Virginia pine, shortleaf pine, and yellow-poplar.

- See table 7 for specific information relating to the potential productivity of these soils.
- The main concerns in managing timber are the hazard of erosion, seedling mortality, plant competition, and low strength.
- Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, culverts, and/or vegetative cover.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for woodland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Brushy thickets can be established by clearing small areas in large tracts of mature woodland.
- Food plots or areas of green browse can be established along logging roads and skid trails.
- The habitat in areas of native plants can be improved by disking and applying lime and fertilizer.
- Den trees should not be harvested.
- Brush piles or other nesting sites are needed.

Urban development
- These soils are poorly suited to urban uses because of the slope, a seasonal high water table, and the shrink-swell potential.
- The soil limitations may be overcome by sound engineering practices.

Interpretive Group

Land capability classification: VIe

UpF—Upshur-Rarden complex, 25 to 60 percent slopes, rocky

Setting

Landform: Mountains
Shape of areas: Convex-linear
Size of areas: 5 to 1,500 acres

Composition

Upshur soil and similar soils: 50 percent
Rarden soil and similar soils: 30 percent
Contrasting components of minor extent: 20 percent

Minor Contrasting Components

- Blairton, Cruze, Dekalb, Marrowbone, and Rayne soils in landform positions similar to those of the Upshur and Rarden soils
- Soils that are clayey-skeletal
- Soils that have bedrock at a depth of more than 60 inches
- Soils that are somewhat poorly drained
- Areas of rock outcrop

Typical Profile

Upshur
Surface layer:
0 to 3 inches—brown silty clay loam

Subsoil:
3 to 7 inches—dark reddish brown clay
7 to 18 inches—dark reddish brown silty clay
18 to 30 inches—dark reddish brown mottled silty clay

Transitional layer:
30 to 42 inches—dusky red mottled very channery silty clay loam

Substratum:
42 to 52 inches—dusky red mottled extremely channery silty clay loam

Bedrock:
52 to 62 inches—siltstone that can be excavated with difficultly

Rarden
Surface layer:
0 to 3 inches—brown silt loam

Subsoil:
3 to 19 inches—dark reddish brown mottled silty clay
19 to 26 inches—yellowish red and light gray silty clay

Bedrock:
26 to 36 inches—siltstone that can be excavated with difficulty

Soil Properties and Qualities

Depth class: Upshur—deep; Rarden—moderately deep
Drainage class: Upshur—well drained; Rarden—moderately well drained
Natural fertility: High
Organic matter content: Low or moderate
Permeability: Slow
Available water capacity: Upshur—low or moderate; Rarden—low
Depth to root zone: Upshur—deep; Rarden—moderately deep
Surface runoff: Very high
Water table (depth, months): Upshur—at a depth of more than 6 feet; Rarden—1.5 to 3 feet from January through April
Flooding: None

Use and Management

Cropland
- These soils are not suited to the production of row crops because of the slope, the hazard of erosion, surface stones, and rock outcrops.

Pasture and hayland
- These soils are not suited to hayland and pasture because of the slope, the hazard of erosion, surface stones, and rock outcrops.
- Several areas, however, have been cleared and are used as unimproved pasture.

Woodland
- These soils are used mainly for woodland production and are currently in second-growth hardwoods.
- Northern red oak, yellow-poplar, white ash, black cherry, red maple, eastern white pine, and Virginia pine are some of the native trees.
- Some trees preferred for planting on these soils are eastern white pine, eastern redcedar, green ash, pin oak, red maple, Virginia pine, shortleaf pine, and yellow-poplar.
- See table 7 for specific information relating to the potential productivity of these soils.
- The main concerns in managing timber are the hazard of erosion, equipment limitations, seedling mortality, and plant competition.
- Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, culverts, and/or vegetative cover.
- The slope, surface stones, and rock outcrops restrict the use of wheeled and tracked equipment on skid trails.
- Cable skidding is safer and disturbs the soil less than other harvesting methods.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for woodland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Brushy thickets can be established by clearing small areas in large tracts of mature woodland.
- Food plots or areas of green browse can be established along logging roads and skid trails.
- The habitat in areas of native plants can be improved by disking and applying lime and fertilizer.
- Den trees should not be harvested.
- Brush piles or other nesting sites are needed.

Urban development
- These soils are not suited to urban uses because of the slope, a seasonal high water table, surface stones, rock outcrops, and the shrink-swell potential.

Interpretive Group

Land capability classification: VIIe

VaF—Vandalia-Beech complex, 20 to 60 percent slopes, stony

Setting

Landform: Mountains
Shape of areas: Irregular
Size of areas: 5 to 500 acres

Composition

Vandalia soil and similar soils: 60 percent
Beech soil and similar soils: 30 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Fedscreek, Hazleton, and Shelocta soils in landform positions similar to those of the Vandalia and Beech soils
- Eroded Vandalia and Beech soils

Typical Profile

Vandalia
Surface layer:
0 to 5 inches—dark yellowish brown loam

Subsoil:
5 to 11 inches—strong brown loam
11 to 18 inches—reddish brown silty clay
18 to 22 inches—reddish brown very channery clay
22 to 29 inches—dark reddish brown clay
29 to 47 inches—dark reddish brown mottled silty clay loam

Substratum:
47 to 61 inches—dark reddish brown mottled very channery silty clay loam
61 to 69 inches—dark reddish brown, reddish yellow, and light yellowish brown very channery silty clay loam

Bedrock:
69 to 79 inches—siltstone that can be excavated with difficulty

Beech
Surface layer:
0 to 5 inches—dark yellowish brown silt loam

Subsoil:
5 to 11 inches—strong brown clay loam

11 to 19 inches—strong brown channery clay loam
19 to 31 inches—strong brown very channery clay loam
31 to 36 inches—strong brown mottled channery clay loam

Transitional layer:
36 to 46 inches—light brownish gray mottled channery clay loam

Substratum:
46 to 67 inches—yellowish brown mottled extremely channery clay loam
67 to 80 inches—light yellowish brown mottled extremely channery clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Vandalia—well drained; Beech—moderately well drained
Natural fertility: Medium
Organic matter content: Low or moderate
Permeability: Vandalia—slow or moderate; Beech—moderate
Available water capacity: Moderate or high
Depth to root zone: Very deep
Surface runoff: High or very high
Water table (depth, months): Vandalia—4 to 6 feet from February through April; Beech—1.5 to 3 feet from February through April
Flooding: None

Use and Management

Cropland
- These soils are not suited to the production of row crops because of the slope, the hazard of erosion, surface stones, and rock outcrops.

Pasture and hayland
- These soils are suited to pasture.
- The slope, the hazard of erosion, droughtiness, surface stones, and rock outcrops may limit the use of equipment in certain areas.
- Long-enduring, drought-tolerant grass and legume species should be selected for planting in order to provide adequate ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion.

Woodland
- These soils are used mainly for woodland production and are currently in second-growth hardwoods.
- Northern red oak, yellow-poplar, shortleaf pine, and Virginia pine are some of the native trees.
- Some trees preferred for planting on these soils are eastern white pine, Virginia pine, black walnut, and yellow-poplar.
- See table 7 for specific information relating to the potential productivity of these soils.
- The main concerns in managing timber are the hazard of erosion, equipment limitations, seedling mortality, and plant competition.
- Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, culverts, and/or vegetative cover.
- The slope, surface stones, and rock outcrops restrict the use of wheeled and tracked equipment on skid trails.
- Cable skidding is safer and disturbs the soil less than other harvesting methods.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for woodland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Brushy thickets can be established by clearing small areas in large tracts of mature woodland.
- Food plots or areas of green browse can be established along logging roads and skid trails.
- The habitat in areas of native plants can be improved by disking and applying lime and fertilizer.
- Den trees should not be harvested.
- Brush piles or other nesting sites are needed.

Urban development
- These soils are not suited to urban uses because of the slope, surface stones, rock outcrops, a seasonal high water table, and the shrink-swell potential.

Interpretive Group

Land capability classification: VIIe

VaF2—Vandalia-Beech complex, 20 to 60 percent slopes, stony, eroded

Setting

Landform: Mountains
Shape of areas: Irregular
Size of areas: 5 to 1,000 acres

Composition

Vandalia soil and similar soils: 60 percent

Figure 12.—An area of Vandalia-Beech complex, 20 to 60 percent slopes, stony, eroded. Erosion is a hazard when areas of this map unit are cleared and used for pasture.

Beech soil and similar soils: 30 percent
Contrasting components of minor extent: 10 percent

Minor Contrasting Components

- Fedscreek, Hazleton, and Shelocta soils in landform positions similar to those of the Vandalia and Beech soils
- Uneroded and severely eroded Vandalia and Beech soils

Typical Profile

Vandalia
Surface layer:
0 to 2 inches—dark yellowish brown silt loam

Subsoil:
2 to 5 inches—strong brown silt loam
5 to 10 inches—yellowish red silty clay
10 to 23 inches—red silty clay
23 to 54 inches—dark reddish brown clay

Substratum:
54 to 69 inches—gray and dark reddish brown silty clay

Bedrock:
69 to 79 inches—rippable siltstone

Beech
Surface layer:
0 to 2 inches—brown silt loam

Subsoil:
2 to 24 inches—strong brown mottled clay loam
24 to 35 inches—strong brown and yellowish brown mottled clay loam
35 to 41 inches—strong brown mottled clay loam
41 to 46 inches—grayish brown mottled clay loam
46 to 60 inches—grayish brown mottled clay loam
60 to 80 inches—grayish brown, brown, and strong brown clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Vandalia—well drained; Beech—moderately well drained
Natural fertility: Low
Organic matter content: Vandalia—low; Beech—low or moderate

Permeability: Vandalia—moderately slow; Beech—slow or moderate
Available water capacity: Moderate or high
Depth to root zone: Vandalia—deep; Beech—very deep
Surface runoff: Rapid
Water table (depth, months): Vandalia—4 to 6 feet from February through April; Beech—1.5 to 3 feet from February through April
Flooding: None

Use and Management

Cropland
- These soils are not suited to the production of row crops because of the slope, the hazard of erosion, surface stones, and rock outcrops.

Pasture and hayland
- These soils are used mainly for pasture.
- The slope, the hazard of erosion, droughtiness, surface stones, and rock outcrops may limit the use of equipment in certain areas.
- Long-enduring, drought-tolerant grass and legume species should be selected for planting in order to provide adequate ground cover and minimize the amount of soil lost through erosion.
- Proper stocking rates and pasture rotation are needed to prevent overgrazing and the resulting soil loss due to erosion (fig. 12).

Woodland
- These soils are suited to woodland production and are currently in second-growth hardwoods.
- Northern red oak, yellow-poplar, shortleaf pine, and Virginia pine are some of the native trees.
- Some trees preferred for planting on these soils are eastern white pine, Virginia pine, black walnut, and yellow-poplar.
- See table 7 for specific information relating to the potential productivity of these soils.
- The main concerns in managing timber are the hazard of erosion, equipment limitations, seedling mortality, and plant competition.
- Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, culverts, and/or vegetative cover.
- The slope, surface stones, and rock outcrops restrict the use of wheeled and tracked equipment on skid trails.
- Cable skidding is safer and disturbs the soil less than other harvesting methods.
- Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

Wildlife habitat
- The potential for woodland wildlife habitat is good.
- Wildlife habitat can be maintained or improved by providing food, cover, nesting areas, and den sites.
- Food plots or areas of green browse can be established along logging roads and skid trails.
- The habitat in areas of native plants can be improved by disking and applying lime and fertilizer.
- Brush piles or other nesting sites are needed.

Urban development
- These soils are not suited to urban uses because of the slope, surface stones, rock outcrops, a seasonal high water table, and the shrink-swell potential.

Interpretive Group

Land capability classification: VIIe

W—Water

This map unit consists of areas inundated with water for most of the year. It generally includes rivers, lakes, and ponds.

Yatesville Lake accounts for 2,240 acres of water in Lawrence County. An additional 679 acres is made up by the Levisa and Tug Forks of the Big Sandy River and other creeks, lakes, streams, sediment ponds, and farm ponds. The largest body of water in Martin County is the Tug Fork of the Big Sandy River.

No interpretations are given for this map unit.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Cropland, Hayland, and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

In 1992, about 54,000 acres were used as cropland, hayland, and pasture in Lawrence and Martin Counties *(24)*. Of this, about 49,500 acres were used for hayland and pasture and about 45,000 acres were used for row crops.

Differences in suitability and management result from differences in soil characteristics, such as depth to bedrock, fertility, erodibility, organic matter content, availability of water for plant growth, drainage, and flooding. Cropping systems, tillage, and field size are also important parts of management. Selecting plant species or a mixture of species that is appropriate to a specific soil helps to realize the greatest yields and the maximum soil and water conservation.

Soil erosion is a primary concern in managing soils for cultivated crops and forage in Lawrence and Martin Counties. Controlling erosion maintains yield potential, reduces the sedimentation of lakes and streams, and improves water quality. Soils that have slopes of more than 2 percent are susceptible to excessive erosion. In order to maintain yields and minimize soil erosion, a resource management plan should be developed to keep soil losses at acceptable levels. Some practices that help to prevent excessive soil erosion are contour farming, conservation tillage, stripcropping, crop rotations that alternate row crops with grasses and legumes, management of crop residue, cover crops, grassed waterways, and diversions and terraces. A cropping sequence that provides sufficient organic residue for the maintenance of soil organic matter also minimizes erosion while improving soil tilth.

Soil drainage is a management concern on about 1 percent of the soils used for cropland, hayland, and pasture in the survey area. High water tables cause lower yields of row and forage crops in most years.

Drainage of certain soils, however, may constitute a violation of Federal law. The local office of the Natural Resources Conservation Service should be contacted before any type of drainage system is installed.

Soil fertility ranges from low to high for most of the soils in Lawrence and Martin Counties. This wide range is due to differences in the soil parent material. For all of the soils in the survey area, the amount of lime and fertilizer to be applied should be based on the results of site-specific soil tests. Information on these soil tests can be obtained at the local office of the Kentucky Cooperative Extension Service.

Soil tilth is an important factor affecting the germination of seeds and the infiltration of water into the soil. Soils that have good tilth are granular and porous and allow adequate movement of air and water in the soil. Penetration of roots and emergence of shoots occur more easily in soils that have these characteristics. Most of the soils used for crops, hayland, and pasture in the survey area have a loam or sandy loam surface layer that is granular and porous. In some areas that have been continually row cropped, however, the soil structure may have been damaged and the organic matter depleted. When soil structure has been damaged, the soil's ability to supply proper amounts of air and water to plants is hindered and yields are reduced.

Organic matter content must be maintained for optimum production. Organic matter affects soil tilth, soil structure, available water-holding capacity, and water infiltration. It is also a main source of nitrogen and phosphorus in unfertilized soils. To keep organic matter at an acceptable level, certain management practices can be used. These practices include adding animal waste to the soil, managing crop residue, growing cover crops, and including grasses and legumes in crop rotations.

Flooding can occur on most of the soils used for cropland, hayland, or pasture in Lawrence and Martin Counties. Flooding occurs frequently on stream bottoms and occasionally to never on steam terraces. The flooding is usually of brief duration. In some years the flooding may reduce crop or forage yields.

Corn and tobacco are the principle row crops grown in the survey area. Specialty crops, such as vegetables, fruit, and nursery stock, are also grown, but they are generally produced in limited quantities. Fescue, orchardgrass, clover, and alfalfa are the principle forage crops grown for hayland and pasture.

Row crops and forage plants should be selected according to the kind of soil and the intended use. Specific information about crops, hayland, or pasture can be obtained at the local office of the Natural Resources Conservation Service or the Kentucky Cooperative Extension Service.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Kentucky Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops *(20)*. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other

characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of map units in this survey area is given in the section "Detailed Soil Map Units" and in the yields table.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 6. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed.

Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Forest Productivity and Management

Charles A. Foster, Forester, Natural Resources Conservation Service, helped prepare this section.

Before Lawrence and Martin Counties were settled, the survey area was entirely forested. The forest acreage has been reduced only about 20 percent in Lawrence County and 12 percent in Martin County *(11)*. Forest stands, however, have been greatly altered by logging, fire, land clearing, abandonment, tree disease, and surface mining.

The original forest was mixed mesophytic and characterized by at least 20 dominant species, including yellow-poplar, American chestnut, red oak, white oak, American beech, and yellow buckeye on moist, well drained, deep soils that had thick layers of humus. Because of land clearing, mining, and soil erosion, the forestland today is more xeric. The dominant timber type is oak-hickory, which makes up about 60 percent of the woodland acreage. The maple-beech-birch type makes up about 25 percent; the elm-ash-red maple type, 5 percent; the oak-pine type, 3 percent; and the pin oak and oak-gum types, the remaining percentage *(11)*.

The first cutting of timber was primarily to clear land for farming. Bottomland woodlands were cleared rapidly. The trees, however, could neither be used nor sold, so they were burned in "logrollings." Small amounts of timber, mainly yellow-poplar, black walnut, and white oak were used for buildings, fences, and furniture. These species were also the main ones sold when markets became available around 1880. This resulted in a gradual deterioration of the quality of the forest areas. At the turn of the century, poorer quality and smaller trees, as well as less desirable species, were harvested. The cutting of oak trees for railroad cross ties began. Small circular sawmills were put into operation in order to clear the best timber in what remained in the culled-over areas.

After the best timber was cut, sawmills began to shut down and the people who had moved to the area with the company-owned mills moved to new locations. The people who remained in the area returned to working the land for a living. Because much of the bottom land was occupied, residents were forced to clear steep slopes for corn crops. The natural fertility and topsoil of the mountains were depleted rapidly. Farmers who had previously spent each fall and winter in logging now cleared a piece of new ground each year. The general economic depression of the 1930's accelerated land clearing. People who lived in industrial areas returned to the hills to live through the hard times.

The gradual clearing of the hillsides continued until about 1950. At that time, there was a decade or more of land abandonment. People moved to towns or other areas. The cleared hillsides again reverted to woodland.

Nature's healing processes were accelerated by a strong tree planting program implemented by State and Federal agencies during the late 1950's and early 1960's. Since 1951, the forest acreage in Lawrence and Martin Counties has increased largely because of tree planting efforts and natural succession and in spite of the large increase in the surface mining of coal.

Lawrence County has about 218,000 acres of commercial forestland, and Martin County has about 130,000 acres *(11)*. The average forest growth is well below the potential of most sites. The most important reason for the low growth is that most of the woodland is not well stocked. This is due not only to past cutting practices, where the best trees were taken and the worst were left, but also because of fire.

Fire causes persistent forest management difficulties in Lawrence and Martin Counties. Because of repeated burning, many areas are stocked with trees of poor quality. When a fire passes over the steep terrain, nearly every tree is killed. Large trees that are not killed generally are scarred enough that they begin to decay. A recent U.S. Forest Service survey in Kentucky showed an average loss of 83 dollars per acre per fire resulting from the mortality or loss in tree quality and value.

The forestry tables can help forest owners or managers plan the use of soils for wood crops. They show the potential productivity of the soils for wood crops and rate the soils according to the limitations that affect various aspects of forest management.

Forest Productivity

In table 7, the *potential productivity* of merchantable or *common trees* on a soil is expressed as a site index and as a volume number. The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that forest

managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. More detailed information regarding site index is available in the "National Forestry Manual," which is available at the local office of the Natural Resources Conservation Service or on the Internet.

The *volume of wood fiber*, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Trees to manage are those that are preferred for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

Forest Management

In table 8, parts I through III, interpretive ratings are given for various aspects of forest management. Some rating class terms indicate the degree to which the soils are suited to a specified forest management practice. *Well suited* indicates that the soil has features that are favorable for the specified practice and has no limitations. Good performance can be expected, and little or no maintenance is needed. *Moderately well suited* indicates that the soil has features that are moderately favorable for the specified practice. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. *Poorly suited* indicates that the soil has one or more properties that are unfavorable for the specified practice. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. *Unsuited* indicates that the expected performance of the soil is unacceptable for the specified practice or that extreme measures are needed to overcome the undesirable soil properties.

The paragraphs that follow indicate the soil properties considered in rating the soils for forest management practices. More detailed information about the criteria used in the ratings is available in the "National Forestry Manual," which is available at the local office of the Natural Resources Conservation Service or on the Internet.

For *limitations affecting construction of haul roads and log landings*, the ratings are based on slope, flooding, permafrost, plasticity index, the hazard of soil slippage, content of sand, the Unified classification, rock fragments on or below the surface, depth to a restrictive layer that is indurated, depth to a water table, and ponding. The limitations are described as slight, moderate, or severe. A rating of *slight* indicates that no significant limitations affect construction activities, *moderate* indicates that one or more limitations can cause some difficulty in construction, and *severe* indicates that one or more limitations can make construction very difficult or very costly.

The ratings of *suitability for log landings* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, ponding, flooding, and the hazard of soil slippage. The soils are described as well suited, moderately suited, or poorly suited to use as log landings.

Ratings in the column *soil rutting hazard* are based on depth to a water table, rock fragments on or below the surface, the Unified classification, depth to a restrictive layer, and slope. Ruts form as a result of the operation of forest equipment. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that the soil is subject to little or no rutting, *moderate* indicates that rutting is likely, and *severe* indicates that ruts form readily.

Ratings in the column *hazard of off-road or off-trail erosion* are based on slope and on soil erodibility factor K. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of *slight* indicates that erosion is unlikely under ordinary climatic conditions; *moderate* indicates that some erosion is likely and that erosion-control measures may be needed; *severe* indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and *very severe* indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Ratings in the column *hazard of erosion on roads and trails* are based on the soil erodibility factor K, slope, and content of rock fragments. The ratings apply to unsurfaced roads and trails. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that little or no erosion is likely; *moderate* indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures are needed; and *severe* indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Ratings in the column *suitability for roads (natural surface)* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, ponding, flooding, and the hazard of soil slippage. The ratings indicate the suitability for using the natural surface of the soil for roads. The soils are described as well suited, moderately well suited, or poorly suited to this use.

Ratings in the columns *suitability for hand planting* and *suitability for mechanical planting* are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, moderately well suited, poorly suited, or unsuited to these methods of planting. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column *suitability for use of harvesting equipment* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, and ponding. The soils are described as well suited, moderately well suited, or poorly suited to this use.

Recreation

The soils of the survey area are rated in table 9, parts I and II, according to limitations that affect their suitability for recreation. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

The ratings in the table are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas.

The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are

depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed

small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Table 10 shows the degree and kind of soil limitations that affect dwellings with and without basements and small commercial buildings.

Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Because of the scarcity of level land and the relatively high population density, many homes and some businesses have been and are being constructed on steeply sloping terrain. This steep terrain is naturally unstable, and various manmade modifications of the slopes can result in a wide assortment of limited to massive slope failures (fig. 13). Whether these slope failures are natural, manmade, or a combination of both, many structures are damaged or destroyed in the survey area because of them. The damage caused by slope failures may or may not be technically nor economically feasible to prevent, and preventive measures are often impractical.

Site selection, foundation preparation, de-watering, structure design, and composition are keys to successful mountainside developments.

Because it is easier and cheaper to avoid a slope-stability problem than to correct it, information on geology and soils should be used to select sites that have the best potential for mountainside development. Intensive use of steep slopes requires careful consideration of the bedrock, soils, and surficial details of individual sites.

Figure 13.—An area showing slope failure as a result of human modifications.

Unstable slopes usually correspond to areas:

- That are steep or very steep,
- That have clayey soils over relatively impermeable shale bedrock,
- That have soils with a high moisture content, usually caused by seepage from underlying bedrock,
- That have excessive ground-water seepage in the soil-bedrock contact zone,
- Where either unloading (excavation) or loading (fill or overcast) upsets slope equilibrium,
- Where a stream is undercutting a toeslope,
- Where there is poor subsurface drainage, or
- Where the mature trees have been cut or killed by fire or disease.

If developments are to be constructed on mountainsides, it is critical to keep the developments, and any water outflow from the developments, away from steep outslope areas.

The introduction of large quantities of water to an apparently stable outslope can cause movement of the outslope materials. Water-induced slides can result from severe storm events as well as from activities of development. Concentrated water sources from development include effluent from septic tanks; runoff from gutters, leaders, and paved areas; and water from plumbing leaks that are common in unstable areas.

The scarcity of level land in the survey area has also lead to the development of homes and businesses in nearly level and gently sloping surfaced mined areas.

The large scale of surface mining operations makes it practical to alter landforms through mining and reclamation, thus increasing land suitability for housing and related development. Such "made land," however, is typically composed of deep soil and rock fills. Such fills undergo long-term settlement (differential settling) under their own weight. This settlement of the land causes many structural and cosmetic problems for homes and businesses,

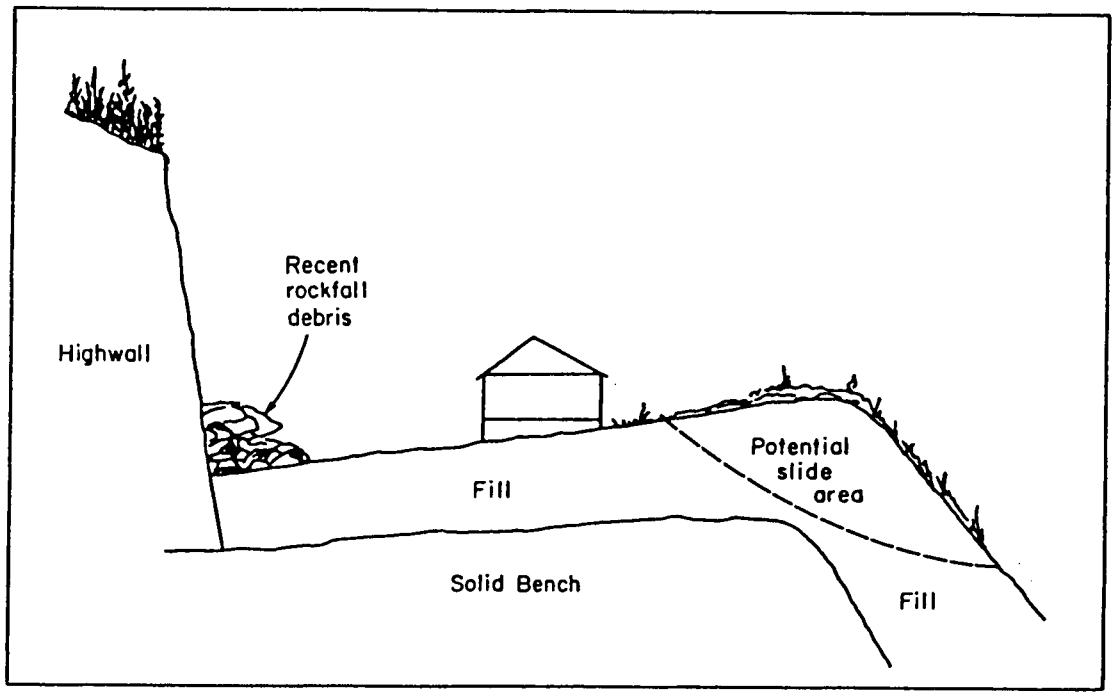


Figure 14.—Characteristics of mined benches produced by "shoot and shove" mining on steeply sloping terrain prior to implementation of current law. The fill beneath the building is shallow and well weathered and has minimum settlement potential. The structure is firmly supported by the undisturbed bench, well removed from the potential slide area and from danger due to rock debris that may fall from the highwall. The dip of the undisturbed bench back toward the highwall moves water away from the potential slide area. The bench also slopes toward or away from the viewer, preventing water from ponding at the base of the highwall, which could cause the fill material to become saturated *(12)*.

including cracks in masonry walls, uneven floors, sticking doors and windows, and the pulling apart of plumbing connections. Underground mining operations can also affect surface structures by causing land subsidence.

For a particular fill, the amount, type, and the rate of settlement depend on a variety of factors. These factors include fill depth, moisture and compaction conditions during reclamation activities, and groundwater conditions after placement.

Some of the most favorable mined land construction sites are located on the level benches produced by the "shoot and shove" mining of the 1950's, 1960's, and early 1970's *(12)*. The reasons that the older benches are favored for construction sites are that depth to bedrock is less than 20 feet and the fill material has had in excess of 20 years to settle. Obviously, it is best to restrict development to well compacted, stable fill material. Strong precautions, however, are in order for anyone choosing to develop these sites (fig. 14).

In general, all recently reclaimed land in surface mined areas should be considered as potentially unstable ground and subject to differential settling, even where normal engineering precautions for good stabilization have been taken in the placement of the fill material.

Sanitary Facilities

Table 11, parts I and II, show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and

moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties

include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Construction Materials

Table 12, parts I and II, give information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

The soils are rated *good, fair,* or *poor* as potential sources of topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the table.

The soils are rated as a *probable* or *improbable* source of sand and gravel. A rating of *probable* means that the source material is likely to be in or below the soil.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the lowest layer of the soil contains sand or gravel, the soil is rated as a probable source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth

to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas *(16)*. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Index Properties

Table 14 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries,

the classification in the marginal zone is generally omitted in the table.

Physical Properties

Table 15 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 15, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K_{sat}) refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in table 15 as the K factor (Kw and Kf) and the T factor. Erosion factor K

indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Chemical Properties

Table 16 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Water Features

Table 17 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by water flowing over the land surface. Runoff classes are estimated by using a combination of surface slope and soil permeability factors. Estimated values are based on the minimum permeability for the soil at or above 0.5 meter. The surface runoff classes are *negligible, very low, low, medium, high,* and *very high.*

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 17 indicates, by month, depth to the top *(upper limit)* and base *(lower limit)* of the saturated zone in most years. Estimates of the upper and lower limits

are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 17 indicates *frequency* of ponding. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Soil Features

Table 18 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness of the restrictive layer, which significantly affects the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(18, 19)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning flood plain, plus *aquent*, the suborder of the Entisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Aeric* identifies the subgroup that is drier than is typical for the great group. An example is Aeric Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, nonacid, mesic Aeric Fluvaquents.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(22)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(19)* and in "Keys to Soil Taxonomy" *(18)*. Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

Allegheny Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Stream terraces
Parent material: Loamy alluvium
Slope range: 2 to 15 percent
Taxonomic class: Fine-loamy, mixed, mesic Typic Hapludults

Associated Soils

- Chagrin soils that are moderately permeable and on flood plains
- Cotaco soils that are somewhat poorly drained and on stream terraces
- Grigsby soils that are coarse-loamy and on flood plains
- Hayter soils that are well drained and on stream terraces
- Holly soils that are poorly drained and on flood plains
- Nelse soils that are coarse-loamy and on banks of major streams and rivers
- Orrville soils that are somewhat poorly drained and on flood plains

Typical Pedon

Allegheny loam, 2 to 6 percent slopes, rarely flooded; in Lawrence County; 9 miles north of Louisa on U.S. Highway 23, about 2,000 feet south of the confluence of Roe Creek and the Big Sandy River, on a terrace; USGS Prichard topographic quadrangle; lat. 38 degrees 13 minutes 21 seconds N. and long. 82 degrees 36 minutes 09 seconds W.

Ap—0 to 8 inches; brown (10YR 4/3) loam, brown (10YR 5/3) dry; moderate fine subangular blocky structure parting to moderate fine and medium granular; friable; common fine roots; slightly acid; abrupt smooth boundary.

Bt1—8 to 21 inches; yellowish brown (10YR 5/6) silt loam; moderate fine and medium subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds and in pores; strongly acid; clear smooth boundary.

Bt2—21 to 33 inches; dark yellowish brown (10YR 4/6) silt loam; moderate fine and medium subangular blocky structure; friable; many distinct clay films on faces of peds and in pores; strongly acid; clear smooth boundary.

Bt3—33 to 52 inches; dark yellowish brown (10YR 4/6) loam; weak fine and medium subangular blocky structure; friable; common distinct clay films on faces of peds and in pores; strongly acid; clear smooth boundary.

C1—52 to 65 inches; yellowish brown (10YR 5/4) sandy loam; single grained; friable; strongly acid; gradual smooth boundary.

C2—65 to 89 inches; light yellowish brown (10YR 6/4) sandy loam; single grained; friable; strongly acid.

Range in Characteristics

Solum thickness: 30 to 72 inches or more
Depth to bedrock: More than 60 inches
Kind and size of rock fragments: Sandstone and siltstone channers and pebbles
Reaction: Extremely acid to strongly acid, except in limed areas

A or Ap horizon:
Hue—7.5YR to 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture of the fine-earth fraction—loam
Rock fragment content—0 to 15 percent
Other characteristics—in some pedons the A horizon is less than 6 inches thick and has value of 3 and chroma of 1 to 3

Bt horizon:
Hue—7.5YR to 2.5Y
Value—4 or 5
Chroma—3 to 8
Texture of the fine-earth fraction—clay loam, sandy clay loam, loam, silt loam, or silty clay loam
Rock fragment content—0 to 30 percent

BC, CB, or C horizon (if it occurs):
Hue—7.5YR to 2.5Y
Value—4 to 6
Chroma—3 to 8
Texture of the fine-earth fraction—fine sandy loam, sandy loam, loam, sandy clay loam, or clay loam
Rock fragment content—0 to 35 percent

Beech Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow or moderate
Landform: Mountains
Parent material: Colluvium from sandstone, siltstone, and shale
Slope range: 20 to 60 percent
Taxonomic class: Fine-loamy, mixed, mesic Oxyaquic Hapludalfs

Associated Soils

- Fedscreek soils that are coarse-loamy and well drained
- Hazleton soils that are loamy-skeletal and well drained
- Shelocta soils that are well drained
- Vandalia soils that are fine and well drained

Typical Pedon

Beech silt loam in an area of Vandalia-Beech

complex, 20 to 60 percent slopes, stony; in Lawrence County; 3.5 miles west of Fallsburg on Kentucky Highway 3 to the confluence of Little Cat Fork and Miller Branch, 4 miles west along Little Cat Fork to a lower side slope on the north side of the gravel road; USGS Webbville topographic quadrangle; lat. 38 degrees 11 minutes 03 seconds N. and long. 82 degrees 47 minutes 41 seconds W.

A—0 to 5 inches; dark yellowish brown (10YR 4/4) silt loam, yellowish brown (10YR 5/4) dry; moderate fine and medium granular structure; friable; many fine, medium, and coarse roots; 10 percent sandstone channers; moderately alkaline; abrupt wavy boundary.

Bt1—5 to 11 inches; strong brown (7.5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; many fine, medium, and coarse roots; common distinct clay films on faces of peds and in pores; 10 percent sandstone channers; moderately acid; clear wavy boundary.

Bt2—11 to 19 inches; strong brown (7.5YR 4/6) channery clay loam; strong medium subangular blocky structure; firm; common fine and medium roots; common distinct clay films on faces of peds and in pores; 15 percent sandstone channers; moderately acid; clear smooth boundary.

Bt3—19 to 31 inches; strong brown (7.5YR 5/6) very channery clay loam; moderate fine and medium subangular blocky structure; firm; fine and medium roots; common distinct clay films on faces of peds and in pores; 40 percent sandstone channers; moderately acid; clear wavy boundary.

Bt4—31 to 36 inches; strong brown (7.5YR 5/8) channery clay loam; strong fine and medium subangular blocky structure; very firm; very few fine roots; few distinct clay films on faces of peds and in pores; common medium prominent light gray (10YR 7/1) redoximorphic depletions; 15 percent sandstone and siltstone channers; moderately acid; abrupt smooth boundary.

BCg—36 to 46 inches; light brownish gray (2.5Y 6/2) channery clay loam; weak coarse subangular blocky structure; very firm; very few fine roots; few distinct clay films on faces of peds and in pores; many medium prominent strong brown (7.5YR 5/8) redoximorphic concentrations; 30 percent sandstone and siltstone channers; strongly acid; abrupt smooth boundary.

C1—46 to 67 inches; yellowish brown (10YR 5/4) extremely channery clay loam; massive; firm; very few fine roots; common medium prominent light brownish gray (2.5Y 6/2) redoximorphic depletions; 70 percent sandstone and siltstone channers; strongly acid; clear smooth boundary.

C2—67 to 80 inches; light yellowish brown (10YR 6/4) extremely channery clay loam; massive; very firm; few medium prominent light brownish gray (2.5Y 6/2) redoximorphic depletions; 60 percent sandstone and siltstone channers; strongly acid.

Range in Characteristics

Solum thickness: 40 to 60 inches
Depth to bedrock: More than 60 inches
Depth to redoximorphic depletions with chroma of 2 or less: Below the upper 10 inches of the argillic horizon and within 36 inches of the soil surface
Kind and size of rock fragments: Sandstone and siltstone channers
Reaction: Very strongly acid to moderately acid

A or Ap horizon:
- Hue—7.5YR or 10YR
- Value—2 to 5
- Chroma—2 to 4
- Texture of the fine-earth fraction—silt loam
- Rock fragment content—0 to 15 percent

AB or BA horizon (if it occurs):
- Hue—7.5YR to 2.5Y
- Value—4 or 5
- Chroma—2 to 4
- Texture of the fine-earth fraction—silt loam or loam
- Rock fragment content—10 to 30 percent

Bt horizon:
- Hue—7.5YR to 2.5Y
- Value—4 to 6
- Chroma—2 to 8
- Texture of the fine-earth fraction—loam or clay loam
- Rock fragment content—15 to 60 percent

BC or CB horizon (if it occurs):
- Hue—7.5YR to 2.5Y
- Value—5 to 7
- Chroma—2 to 8
- Texture of the fine-earth fraction—loam or clay loam
- Rock fragment content—15 to 60 percent

C horizon:
- Hue—7.5YR to 2.5Y
- Value—4 to 6
- Chroma—2 to 8
- Texture of the fine-earth fraction—loam, silt loam, or clay loam
- Rock fragment content—15 to 70 percent

Blairton Series

Depth class: Moderately deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Landform: Mountains
Parent material: Residuum from interbedded siltstone, shale, and fine-grained sandstone
Slope range: 6 to 60 percent
Taxonomic class: Fine-loamy, mixed, mesic Aquic Hapludults

Associated Soils

- Cruze soils that are deep and clayey
- Dekalb soils that are moderately deep and loamy-skeletal
- Fairpoint, Fiveblock, and Kaymine soils that are in surface mined areas
- Marrowbone soils that are moderately deep and coarse-loamy
- Rarden soils that are fine
- Upshur soils that are deep and fine
- Rayne soils that are deep

Typical Pedon

Blairton silt loam in an area of Blairton-Cruze-Marrowbone complex, 6 to 12 percent slopes (fig. 15); in Lawrence County; 3 miles north of Blaine on Kentucky Highway 201 to its intersection with Cherokee-Irish Creek Road, 1.25 miles east on Cherokee-Irish Creek Road to the confluence of Irish Creek and Blaine Creek, 1,300 feet east along Blaine Creek to a U.S. Army Corps of Engineers gate located on the left side of the road, 1,100 feet northeast to a ridge located between Irish Creek and Lick Branch; USGS Blaine topographic quadrangle; lat. 38 degrees 03 minutes 55 seconds N. and long. 82 degrees 47 minutes 56 seconds W.

A—0 to 5 inches; brown (10YR 5/3) silt loam, pale brown (10YR 5/3) dry; moderate fine and medium subangular blocky structure; friable; many fine, medium, and coarse roots; 5 percent siltstone channers; very strongly acid; abrupt wavy boundary.

Bt1—5 to 15 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; many fine, medium, and coarse roots; many distinct clay films on faces of peds and in pores; 5 percent siltstone channers; very strongly acid; clear wavy boundary.

Bt2—15 to 23 inches; strong brown (7.5YR 5/6) channery silt loam; moderate medium subangular blocky structure; friable; common fine, medium, and coarse roots; many distinct clay films on faces of peds and in pores; many medium prominent light gray (2.5Y 7/2) redoximorphic depletions; 15 percent siltstone channers; very strongly acid; clear wavy boundary.

BCg—23 to 37 inches; light brownish gray (2.5Y 6/2) very channery silt loam; weak fine and medium subangular blocky structure; friable; few fine roots; moderate medium prominent strong brown (7.5YR 5/6 and 5/8) redoximorphic concentrations; 50 percent siltstone and shale channers; very strongly acid; clear wavy boundary.

Cr—37 to 47 inches; shale bedrock that can be excavated.

Range in Characteristics

Solum thickness: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Depth to redoximorphic depletions with chroma of 2 or less: Within the upper 24 inches of the argillic horizon
Kind and size of rock fragments: Shale, sandstone, and siltstone channers
Reaction: Extremely acid or very strongly acid

A or Ap horizon:
Hue—7.5YR to 2.5Y
Value—3 to 5
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam
Rock fragment content—5 to 15 percent

Bt horizon:
Hue—7.5YR to 2.5Y
Value—4 to 6
Chroma—2 to 8
Texture of the fine-earth fraction—loam, silt loam, or silty clay loam
Rock fragment content—5 to 50 percent

BCg, CB, or C horizon:
Hue—7.5YR to 2.5Y
Value—4 to 6
Chroma—2 to 8
Texture of the fine-earth fraction—silt loam, silty clay loam, or silty clay
Rock fragment content—15 to 90 percent

Chagrin Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Flood plains
Parent material: Loamy alluvium

Slope range: 0 to 3 percent
Taxonomic class: Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts

Associated Soils

- Allegheny soils that are moderately permeable and on stream terraces
- Cotaco soils that are somewhat poorly drained and on stream terraces
- Grigsby soils that are coarse-loamy and on flood plains
- Hayter soils that have moderately rapid permeability and are on stream terraces
- Holly soils that are poorly drained and on flood plains
- Nelse soils that are coarse-loamy and on banks of major streams and rivers
- Orrville soils that are somewhat poorly drained and on flood plains

Typical Pedon

Chagrin loam, frequently flooded; in Lawrence County; 5 miles northwest of Louisa on Kentucky Highway 3 to Fallsburg, 11.2 miles north of Fallsburg on Kentucky Highway 3, about 2,100 feet east of Kentucky Highway 3, in a bottom on the west side of the East Fork of the Little Sandy River; USGS Boltsfork topographic quadrangle; lat. 38 degrees 15 minutes 19 seconds N. and long. 82 degrees 41 minutes 26 seconds W.

Ap—0 to 10 inches; brown (10YR 4/3) loam, brown (10YR 5/3) dry; moderate fine and medium granular structure; friable; many fine roots; slightly acid; clear smooth boundary.

Bw1—10 to 22 inches; dark yellowish brown (10YR 4/4) loam; moderate fine and medium subangular blocky structure; friable; common fine roots; slightly acid; clear wavy boundary.

Bw2—22 to 58 inches; dark yellowish brown (10YR 4/6) silt loam; moderate fine and medium subangular blocky structure; friable; few fine roots; common medium distinct brown (10YR 5/3) redoximorphic concentrations; slightly acid; clear smooth boundary.

Bw3—58 to 82 inches; strong brown (7.5YR 5/6) silt loam; weak fine and medium subangular blocky structure; friable; few fine roots; many medium distinct light brownish gray (10YR 6/2) redoximorphic depletions; few dark organic stains; slightly acid; abrupt smooth boundary.

C—82 to 90 inches; strong brown (7.5YR 5/6) silt loam; massive; friable; very few fine roots; many medium distinct light brownish gray (10YR 6/2) redoximorphic depletions; few dark organic stains; slightly acid.

Range in Characteristics

Solum thickness: 60 inches or more
Depth to bedrock: More than 60 inches
Kind and size of rock fragments: Sandstone and siltstone channers and gravel
Reaction: Moderately acid to neutral

A or Ap horizon:
Hue—7.5YR or 10YR
Value—2 to 4 (6 dry)
Chroma—2 to 4
Texture of the fine-earth fraction—loam
Rock fragment content—0 to 10 percent

Bw horizon:
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—3 to 6
Texture of the fine-earth fraction—silt loam, loam, sandy loam, fine sandy loam, sandy clay loam, clay loam, or silty clay loam
Rock fragment content—0 to 15 percent

BC, CB, or C horizon:
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—2 to 6
Texture of the fine-earth fraction—generally silt loam, loam, or sandy loam; below a depth of 40 inches horizon may be fine sand or loamy fine sand
Rock fragment content—0 to 20 percent

Cloverlick Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate or moderately rapid
Landform: Mountains
Parent material: Colluvium from interbedded sandstone, siltstone, and shale
Slope range: 30 to 80 percent
Taxonomic class: Loamy-skeletal, mixed, mesic Umbric Dystrochrepts

Associated Soils

- Fairpoint, Fiveblock, and Kaymine soils that are in surface mined areas
- Fedscreek soils that are coarse-loamy
- Hazleton soils that do not have a dark surface layer
- Shelocta soils that are fine-loamy

Typical Pedon

Cloverlick very channery loam in an area of Cloverlick-Hazleton-Shelocta complex, 30 to 80 percent slopes, very stony (fig. 16); in Martin County; 6 miles southwest of Lovely on Kentucky Highway 1714 to the junction of Kentucky Highway 1439 at Pigeonroost, 5 miles southwest on Kentucky Highway 1439 to the junction of Meathouse Creek, 4 miles southeast along Meathouse Creek, 500 feet southeast on a gas well road, on a lower cool colluvial side slope; USGS Thomas topographic quadrangle; lat. 37 degrees 41 minutes 07 seconds N. and long. 82 degrees 29 minutes 10 seconds W.

A—0 to 9 inches; very dark grayish brown (10YR 3/2) very channery loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; very friable; many fine and medium roots; 50 percent sandstone channers; moderately acid; clear wavy boundary.

Bw1—9 to 18 inches; yellowish brown (10YR 5/6) channery loam; moderate fine and medium subangular blocky structure; friable; common fine and medium roots; 30 percent sandstone channers; very strongly acid; clear wavy boundary.

Bw2—18 to 35 inches; yellowish brown (10YR 5/6) extremely channery loam; weak fine and medium subangular blocky structure; friable; few fine roots; 5 percent coal flecks; 60 percent sandstone channers and flagstones; very strongly acid; gradual smooth boundary.

Bw3—35 to 48 inches; yellowish brown (10YR 5/6) extremely channery loam; weak fine and medium subangular blocky structure; firm; few fine roots; 5 percent coal flecks; 65 percent sandstone channers and flagstones; very strongly acid; clear smooth boundary.

BC—48 to 66 inches; yellowish brown (10YR 5/4) extremely channery clay loam; weak fine and medium subangular blocky structure; very firm; very few fine roots; 5 percent coal flecks; 80 percent sandstone channers and flagstones; strongly acid; clear wavy boundary.

C—66 to 86 inches; dark yellowish brown (10YR 4/6) extremely channery sandy loam; common medium distinct grayish brown (10YR 5/2) lithochromic mottles; massive; firm; 5 percent coal flecks; 70 percent sandstone channers and flagstones; strongly acid.

Range in Characteristics

Solum thickness: 40 to 60 inches or more
Depth to bedrock: More than 60 inches
Kind and size of rock fragments: Sandstone and siltstone channers and flagstones
Reaction: Extremely acid to slightly acid

A horizon:
- Hue—10YR
- Value—2 or 3
- Chroma—1 to 3
- Texture of the fine-earth fraction—loam
- Rock fragment content—15 to 60 percent

AB or BA horizon (if it occurs):
- Hue—10YR
- Value—2 to 4
- Chroma—3 to 6
- Texture of the fine-earth fraction—loam or silt loam
- Rock fragment content—15 to 50 percent

Bw horizon:
- Hue—7.5YR or 10YR
- Value—4 or 5
- Chroma—3 to 6
- Texture of the fine-earth fraction—loam or silt loam
- Rock fragment content—20 to 70 percent

BC, CB, or C horizon:
- Hue—10YR or 2.5Y
- Value—4 to 6
- Chroma—2 to 6
- Texture of the fine-earth fraction—sandy loam, loam, or clay loam
- Rock fragment content—20 to 90 percent
- Other characteristics—redoximorphic depletions and redoximorphic concentrations in shades of brown, olive, or gray

Cotaco Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Landform: Stream terraces
Parent material: Loamy alluvium
Slope range: 0 to 12 percent
Taxonomic class: Fine-loamy, mixed, mesic Aquic Hapludults

Associated Soils

- Allegheny soils that are well drained and on stream terraces
- Chagrin soils that are moderately permeable and on flood plains
- Grigsby soils that are coarse-loamy and on flood plains

- Hayter soils that are well drained and on stream terraces
- Holly soils that are poorly drained and on flood plains
- Nelse soils that are coarse-loamy and on banks of major streams and rivers
- Orrville soils that are somewhat poorly drained and on flood plains

Typical Pedon

Cotaco silt loam, 0 to 4 percent slopes, occasionally flooded; in Lawrence County; 2.5 miles west of Blaine on Kentucky Highway 32 to the confluence of Lower Laurel Creek and Blaine Creek, 0.25 mile south along Lower Laurel Creek Road to a terrace on the west side of the road; USGS Mazie topographic quadrangle; lat. 38 degrees 01 minute 08 seconds N. and long. 82 degrees 52 minutes 37 seconds W.

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) silt loam, yellowish brown (10YR 5/4) dry; moderate fine and medium granular structure; friable; common fine roots; moderately alkaline; abrupt smooth boundary.

Bt—9 to 19 inches; brown (10YR 5/3) silt loam; weak fine and medium subangular blocky structure; friable; few fine roots; few distinct clay films on faces of peds and in pores; common medium prominent strong brown (7.5YR 5/8) redoximorphic concentrations; strongly acid; clear wavy boundary.

Btg1—19 to 25 inches; yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) silt loam; moderate fine and medium subangular blocky structure; friable; very few fine roots; many distinct clay films on faces of peds and in pores; strongly acid; clear wavy boundary.

Btg2—25 to 40 inches; light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; very few fine roots; many distinct clay films on faces of peds and in pores; strongly acid; clear wavy boundary.

Btg3—40 to 55 inches; light brownish gray (10YR 6/2) silt loam; moderate coarse and medium subangular blocky structure; friable; very few fine roots; many distinct clay films on faces of peds and in pores; many medium prominent strong brown (7.5YR 5/6) redoximorphic concentrations; strongly acid; clear wavy boundary.

Cg—55 to 77 inches; light brownish gray (10YR 6/2) silt loam; massive; firm; very few fine roots; many medium prominent strong brown (7.5YR 5/6) redoximorphic concentrations; 5 percent sandstone gravel; strongly acid; clear wavy boundary.

C—77 to 85 inches; strong brown (7.5YR 4/6) silt loam; massive; firm; many medium prominent light brownish gray (10YR 6/2) redoximorphic depletions; 5 percent sandstone gravel; strongly acid.

Range in Characteristics

Solum thickness: 30 to 60 inches
Depth to bedrock: More than 60 inches
Depth to redoximorphic depletions with chroma of 2 or less: Within the upper 24 inches of the argillic horizon
Kind and size of rock fragments: Sandstone and siltstone channers and pebbles
Reaction: Extremely acid to strongly acid

A or Ap horizon:
Hue—10YR
Value—4 to 6
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam
Rock fragment content—0 to 15 percent

Bt horizon:
Hue—5YR to 2.5Y
Value—4 to 6
Chroma—3 to 8
Texture of the fine-earth fraction—silt loam, loam, clay loam, or sandy clay loam
Rock fragment content—0 to 35 percent

Btg horizon:
Hue—5YR to 2.5Y
Value—4 to 6
Chroma—1 to 8
Texture of the fine-earth fraction—silt loam, loam, clay loam, or sandy clay loam
Rock fragment content—0 to 35 percent

BC, CB, C, or Cg horizon:
Hue—7.5YR to 2.5Y
Value—4 to 8
Chroma—0 to 8
Texture of the fine-earth fraction—silt loam, loam, clay loam, or sandy clay loam
Rock fragment content—2 to 50 percent

Cruze Series

Depth class: Deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Mountains

Parent material: Residuum from mainly acid shale with thin layers of siltstone and sandstone
Slope range: 6 to 25 percent
Taxonomic class: Clayey, mixed, mesic Aquic Hapludults

Associated Soils

- Blairton soils that are moderately deep and fine-loamy
- Dekalb soils that are moderately deep and loamy-skeletal
- Fairpoint, Fiveblock, and Kaymine soils in surface mined areas
- Marrowbone soils that are moderately deep and coarse-loamy
- Rarden soils that are moderately deep and fine
- Upshur soils that are fine and well drained
- Rayne soils that are fine-loamy

Typical Pedon

Cruze silt loam in an area of Blairton-Cruze-Marrowbone complex, 12 to 25 percent slopes; in Lawrence County; 3 miles north of Blaine on Kentucky Highway 201 to the intersection of Cherokee-Irish Creek Road, 1.25 miles east on Cherokee-Irish Creek Road to the confluence of Irish Creek and Blaine Creek, 1,300 feet east along Blaine Creek to a U.S. Army Corps of Engineers gate located on the left side of the road, 1,150 feet northeast to a ridge located between Irish Creek and Lick Branch; USGS Blaine topographic quadrangle; lat. 38 degrees 03 minutes 55 seconds N. and long. 82 degrees 47 minutes 55 seconds W.

A—0 to 2 inches; brown (10YR 4/3) silt loam, brown (10YR 5/3) dry; weak fine granular structure; friable; many fine and medium roots; 5 percent sandstone channers; strongly acid; abrupt wavy boundary.
Bt1—2 to 6 inches; strong brown (7.5YR 5/6) silty clay loam; moderate fine and medium subangular blocky structure; friable; common fine, medium, and coarse roots; many distinct clay films on faces of peds and in pores; 5 percent sandstone channers; very strongly acid; clear wavy boundary.
Bt2—6 to 18 inches; strong brown (7.5YR 5/6) silty clay; strong fine and medium subangular blocky structure; firm; common fine, medium, and coarse roots; many distinct clay films on faces of peds and in pores; few medium prominent light gray (N 7/0) redoximorphic depletions; 5 percent sandstone channers; very strongly acid; clear wavy boundary.
Btg1—18 to 27 inches; gray (10YR 6/1) silty clay; many medium prominent red (10R 4/6) lithochromic mottles; strong fine and medium subangular blocky structure; very firm; few fine and medium roots; many distinct clay films on faces of peds and in pores; many medium prominent strong brown (7.5YR 5/6) redoximorphic concentrations; very strongly acid; abrupt wavy boundary.
Btg2—27 to 39 inches; white (N 8/0) extremely channery silty clay loam; weak fine and medium subangular blocky structure; very firm; very few fine roots; many distinct clay films on faces of peds and in pores; many medium prominent strong brown (7.5YR 5/8) redoximorphic concentrations; 60 percent siltstone channers; very strongly acid; clear wavy boundary.
Cg—39 to 48 inches; white (N 8/0) extremely channery silty clay loam; massive; very firm; many medium prominent strong brown (7.5YR 5/8) redoximorphic concentrations; 85 percent siltstone channers; very strongly acid; abrupt wavy boundary.
Cr—48 to 58 inches; light gray shale bedrock that can be excavated.

Range in Characteristics

Solum thickness: 36 to 60 inches
Depth to bedrock: 40 to 60 inches
Depth to redoximorphic depletions with chroma of 2 or less: Within the upper 24 inches of the argillic horizon
Kind and size of rock fragments: Shale, siltstone, and sandstone channers
Reaction: Extremely acid to moderately acid

A horizon:
Hue—10YR
Value—3 to 5
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam
Rock fragment content—0 to 15 percent sandstone or siltstone channers

Bt horizon (upper part):
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—3 to 6
Texture of the fine-earth fraction—silty clay loam or silty clay
Rock fragment content—0 to 35 percent sandstone, siltstone, or shale channers

Bt horizon (lower part):
Hue—10YR, 2.5Y, or neutral
Value—4 to 6
Chroma—1 to 6

Texture of the fine-earth fraction—silty clay loam, silty clay, or clay
Rock fragment content—0 to 60 percent sandstone, siltstone, or shale channers

BC, CB, C, or Cg horizon:
Hue—10YR, 2.5Y, or neutral
Value—4 to 6
Chroma—1 to 6
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay
Rock fragment content—0 to 85 percent sandstone, siltstone, or shale channers

Dekalb Series

Depth class: Moderately deep
Drainage class: Excessively drained
Permeability: Rapid
Landform: Mountains
Parent material: Residuum from acid sandstone, interbedded with shale and graywacke
Slope range: 20 to 80 percent
Taxonomic class: Loamy-skeletal, mixed, mesic Typic Dystrochrepts

Associated Soils

- Blairton soils that are fine-loamy
- Cruze soils that are deep and clayey
- Fairpoint, Fiveblock, and Kaymine soils that are in surface mined areas
- Marrowbone soils that are coarse-loamy
- Rarden soils that are moderately well drained and fine
- Upshur soils that are deep and fine
- Rayne soils that are deep and fine-loamy

Typical Pedon

Dekalb very channery sandy loam in an area of Rayne-Marrowbone-Dekalb complex, 20 to 80 percent slopes, very rocky; in Martin County; 9.5 miles west of Inez on Kentucky Highway 40 to the Johnson-Martin County line, 2.5 miles southwest on a county road that runs down the Johnson-Martin County line to an unimproved surface mine road, 250 feet southeast along the unimproved surface mine road, on a ridge; USGS Offutt topographic quadrangle; lat. 37 degrees 49 minutes 30 seconds N. and long. 82 degrees 38 minutes 52 seconds W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) very channery sandy loam, brown (10YR 5/3) dry; moderate fine and medium granular structure; friable; many fine, medium, and coarse roots; 50 percent sandstone channers; very strongly acid; clear wavy boundary.
Bw1—4 to 13 inches; light yellowish brown (10YR 6/4) extremely channery sandy loam; weak fine and medium subangular blocky structure; friable; many fine, medium, and coarse roots; 80 percent sandstone channers and flagstones; strongly acid; clear wavy boundary.
Bw2—13 to 24 inches; light yellowish brown (10YR 6/4) extremely channery sandy loam; weak fine and medium subangular blocky structure; friable; common fine and medium roots; 80 percent sandstone channers and flagstones; strongly acid; clear wavy boundary.
Cr—24 to 28 inches; fractured sandstone that can be excavated.
R—28 inches; hard sandstone bedrock.

Range in Characteristics

Solum thickness: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Kind of rock fragments: Sandstone and siltstone
Reaction: Extremely acid to strongly acid

A or Ap horizon:
Hue—10YR
Value—2 to 4
Chroma—1 to 4
Texture of the fine-earth fraction—sandy loam
Rock fragment content—10 to 60 percent

Bw horizon:
Hue—7.5YR or 10YR
Value—5 to 8
Chroma—4 to 8
Texture of the fine-earth fraction—loam, fine sandy loam, or sandy loam
Rock fragment content—10 to 80 percent

BC, CB, or C horizon (if it occurs):
Hue—7.5YR or 10YR
Value—5 to 8
Chroma—4 to 8
Texture of the fine-earth fraction—sandy loam, fine sandy loam, loam, or loamy sandy
Rock fragment content—50 to 90 percent

Fairpoint Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Mountains
Parent material: Weathered regolith; bedrock fragments of interbedded sandstone, siltstone,

shale, and coal created from surface mining for coal
Slope range: 0 to 80 percent
Taxonomic class: Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents

Associated Soils

- Blairton soils that are moderately deep and fine-loamy
- Cloverlick soils have a dark surface layer
- Cruze soils that are deep and clayey
- Dekalb soils that are moderately deep
- Fedscreek soils that are fine-loamy
- Fiveblock soils that contain less than 18 percent clay in the particle-size control section
- Hazleton soils that are Inceptisoils
- Kaymine soils that do not include textures of clay loam and silty clay loam and have moderate or moderately rapid permeability
- Marrowbone soils that are moderately deep and coarse-loamy
- Shelocta soils that are fine-loamy
- Rayne soils that are fine-loamy

Typical Pedon

Fairpoint channery silt loam in an area of Fiveblock, Fairpoint, and Kaymine soils, 30 to 80 percent slopes, stony; in Martin County; 4.8 miles north of Inez on Kentucky Highway 3 to the confluence of Lick Branch and Rockcastle Creek, 1.7 miles southeast along Lick Branch on a surface mine road; USGS Milo topographic quadrangle; lat. 37 degrees 54 minutes 01 second N. and long. 82 degrees 31 minutes 25 seconds W.

Ap—0 to 7 inches; very dark gray (N 3/0) channery silt loam, dark gray (N 4/0) dry; many medium distinct brown (10YR 5/3) lithochromic mottles; moderate fine subangular blocky structure parting to moderate fine and medium granular; friable; common fine roots; 15 percent sandstone channers; strongly acid; clear wavy boundary.
C1—7 to 19 inches; dark gray (5Y 4/1) very channery silt loam; many medium prominent brown (10YR 5/3) and yellowish brown (10YR 5/6) lithochromic mottles; massive; firm; few fine roots; 45 percent sandstone and siltstone channers; slightly acid; clear wavy boundary.
C2—19 to 30 inches; dark grayish brown (2.5Y 4/2) very flaggy silt loam; common medium distinct gray (2.5Y 6/0) and strong brown (7.5YR 5/6) lithochromic mottles; massive; very firm; 50 percent sandstone and siltstone channers and flagstones; slightly acid; clear smooth boundary.
C3—30 to 45 inches; olive gray (5Y 4/2) very flaggy silt loam; many medium distinct gray (N 5/0) lithochromic mottles; massive; very firm; 50 percent sandstone and siltstone channers and flagstones; moderately acid; gradual smooth boundary.
C4—45 to 80 inches; olive gray (5Y 4/2) extremely flaggy silt loam; common medium distinct gray (N 5/0) lithochromic mottles; massive; very firm; 60 percent sandstone and siltstone channers and flagstones; slightly acid.

Range in Characteristics

Solum thickness: 0 to 20 inches
Depth to bedrock: More than 60 inches
Kind and size of rock fragments: Sandstone, siltstone, shale, and coal channers, flagstones, stones, and boulders
Reaction: Strongly acid to slightly alkaline

A or Ap horizon:
Hue—7.5YR to 5Y or neutral
Value—3 to 6
Chroma—0 to 6
Texture of the fine-earth fraction—silt loam
Rock fragment content—15 to 35 percent

C horizon:
Hue—7.5YR to 5Y or neutral
Value—3 to 6
Chroma—0 to 8
Texture of the fine-earth fraction—silt loam, silty clay loam, loam, or clay loam
Rock fragment content—35 to 60 percent

Fedscreek Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Mountains
Parent material: Colluvium from interbedded sandstone, siltstone, and shale
Slope range: 30 to 80 percent
Taxonomic class: Coarse-loamy, mixed, mesic Typic Dystrochrepts

Associated Soils

- Cloverlick soils that have a dark surface layer
- Fairpoint, Fiveblock, and Kaymine soils that are in surface mined areas
- Hazleton soils that are loamy-skeletal
- Rigley soils that are associated with the Lee Geologic Formation
- Shelocta soils that are fine-loamy

Typical Pedon

Fedscreek fine sandy loam in an area of Hazleton-Shelocta-Fedscreek complex, 30 to 80 percent slopes, very stony; in Martin County; 6 miles southwest of Lovely on Kentucky Highway 1714 to Pigeonroost, 5.5 miles south along Pigeonroost Fork to Laura, 1.5 miles southeast along Hobbs Fork on a gas well road to the confluence of Hobbs Fork and Rocklick Branch, 4,000 feet south to the confluence of Gourdneck Branch and Hobbs Fork, 200 feet west along Gourdneck Branch, on a middle, warm colluvial side slope; USGS Varney topographic quadrangle; lat. 37 degrees 38 minutes 58 seconds N. and long. 82 degrees 24 minutes 36 seconds W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure parting to weak fine granular; friable; many fine and medium roots; 5 percent sandstone channers; strongly acid; abrupt smooth boundary.

Bw1—4 to 11 inches; yellowish brown (10YR 5/6) channery sandy loam; moderate fine and medium subangular blocky structure; friable; common fine and medium roots; 20 percent sandstone channers; strongly acid; clear smooth boundary.

Bw2—11 to 20 inches; yellowish brown (10YR 5/6) channery sandy loam; moderate medium subangular blocky structure; friable; common fine and medium roots; 15 percent sandstone channers; strongly acid; gradual smooth boundary.

Bw3—20 to 39 inches; strong brown (7.5YR 5/8) channery sandy loam; common medium prominent light yellowish brown (2.5Y 6/4) lithochromic mottles; moderate medium subangular blocky structure; friable; few fine roots; 15 percent sandstone channers; strongly acid; clear smooth boundary.

Bw4—39 to 59 inches; strong brown (7.5YR 5/8) channery sandy loam; few medium distinct light yellowish brown (10YR 6/4) lithochromic mottles; moderate medium subangular blocky structure; very firm; few fine roots; 30 percent sandstone channers; strongly acid; clear wavy boundary.

Bw5—59 to 74 inches; strong brown (7.5YR 5/8) channery sandy loam; common medium prominent light yellowish brown (2.5Y 6/4) lithochromic mottles; weak fine and medium subangular blocky structure; firm; few fine, medium, and coarse roots; 15 percent sandstone channers; moderately acid; clear wavy boundary.

2C—74 to 82 inches; yellowish brown (10YR 5/6) very channery loam; many medium prominent light yellowish brown (2.5Y 6/4) lithochromic mottles; massive; firm; few fine roots; 55 percent siltstone channers; moderately acid.

Range in Characteristics

Solum thickness: 40 to 60 inches or more
Depth to bedrock: More than 60 inches
Kind and size of rock fragments: Sandstone and siltstone channers and flagstones
Reaction: Very strongly acid to slightly acid

A horizon:
Hue—10YR
Value—3 to 5
Chroma—2 to 4
Texture of the fine-earth fraction—fine sandy loam
Rock fragment content—5 to 15 percent

AB or BA horizon (if it occurs):
Hue—10YR
Value—4 or 5
Chroma—4 to 6
Texture of the fine-earth fraction—sandy loam
Rock fragment content—5 to 25 percent

Bw horizon (upper part):
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—4 to 8
Texture of the fine-earth fraction—sandy loam, fine sandy loam, or loam
Rock fragment content—5 to 35 percent

Bw horizon (lower part):
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—3 to 8
Texture of the fine-earth fraction—sandy loam, fine sandy loam, or loam
Rock fragment content—5 to 50 percent

BC, CB, C, or 2C horizon (if it occurs):
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—3 to 8
Texture of the fine-earth fraction—sandy loam, loam, fine sandy loam, or silt loam
Rock fragment content—5 to 60 percent

Fiveblock Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid or rapid
Landform: Mountains
Parent material: Weathered regolith; bedrock fragments of interbedded sandstone, siltstone,

shale, and coal created from surface mining for coal

Slope range: 0 to 80 percent

Taxonomic class: Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents

Associated Soils

- Blairton soils that are moderately deep and fine-loamy
- Cloverlick soils that have a dark surface layer
- Cruze soils that are deep and very deep and are clayey
- Dekalb soils that are moderately deep
- Fedscreek soils that are fine-loamy
- Fairpoint soils that have moderately slow permeability
- Hazleton soils that are Inceptisoils
- Kaymine soils that do not include textures of clay loam and silty clay loam and have moderate or moderately rapid permeability
- Marrowbone soils that are moderately deep and coarse-loamy
- Shelocta soils that are fine-loamy
- Rayne soils that are fine-loamy

Typical Pedon

Fiveblock channery sandy loam in an area of Fiveblock, Fairpoint, and Kaymine soils, 30 to 80 percent slopes, stony; in Martin County; 0.5 mile north of Warfield on Kentucky Highway 292 to the intersection of an intermittent drain and the Tug Fork of the Big Sandy River, 0.75 mile northwest on a surface mine road; USGS Kermit topographic quadrangle; lat. 37 degrees 51 minutes 25 seconds N. and long. 82 degrees 25 minutes and 04 seconds W.

Ap—0 to 4 inches; dark yellowish brown (10YR 4/4) channery sandy loam, yellowish brown (10YR 5/4) dry; weak fine and medium granular structure; friable; common fine roots; 25 percent sandstone channers; moderately acid; abrupt wavy boundary.

C1—4 to 18 inches; dark yellowish brown (10YR 4/4) extremely channery sandy loam; massive; very firm; few fine roots; 65 percent sandstone channers; moderately acid; gradual smooth boundary.

C2—18 to 38 inches; brown (10YR 4/3) extremely flaggy sandy loam; massive; very firm; few fine roots; 75 percent sandstone channers and flagstones; moderately acid; clear smooth boundary.

C3—38 to 48 inches; brown (10YR 5/3) extremely flaggy sandy loam; massive; very firm; very few fine roots; 75 percent sandstone channers and flagstones; moderately alkaline; clear wavy boundary.

C4—48 to 65 inches; yellowish brown (10YR 5/6) extremely flaggy sandy loam; massive; very firm; 85 percent sandstone and siltstone channers and flagstones; moderately acid; gradual smooth boundary.

C5—65 to 80 inches; brown (10YR 5/3) extremely flaggy sandy loam; massive; very firm; 90 percent sandstone and siltstone channers and flagstones; moderately acid.

Range in Characteristics

Solum thickness: 0 to 20 inches

Depth to bedrock: More than 60 inches

Kind and size of rock fragments: Sandstone, siltstone, shale, and coal channers, flagstones, stones, and boulders

Reaction: Moderately acid to slightly alkaline

A or Ap horizon:
Hue—10YR
Value—3 to 5
Chroma—1 to 4
Texture of the fine-earth fraction—sandy loam
Rock fragment content—15 to 35 percent

C horizon:
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—1 to 6
Texture of the fine-earth fraction—sandy loam or loamy sand
Rock fragment content—15 to 90 percent

Grigsby Series

Depth class: Very deep

Drainage class: Well drained

Permeability: Moderate or moderately rapid

Landform: Flood plains

Parent material: Mixed alluvium

Slope range: 0 to 3 percent

Taxonomic class: Coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts

Associated Soils

- Allegheny soils that are fine-loamy and on stream terraces
- Chagrin soils that are fine-loamy
- Cotaco soils that are somewhat poorly drained and on stream terraces
- Hayter soils that are fine-loamy and on stream terraces
- Holly soils that are poorly drained and fine-loamy

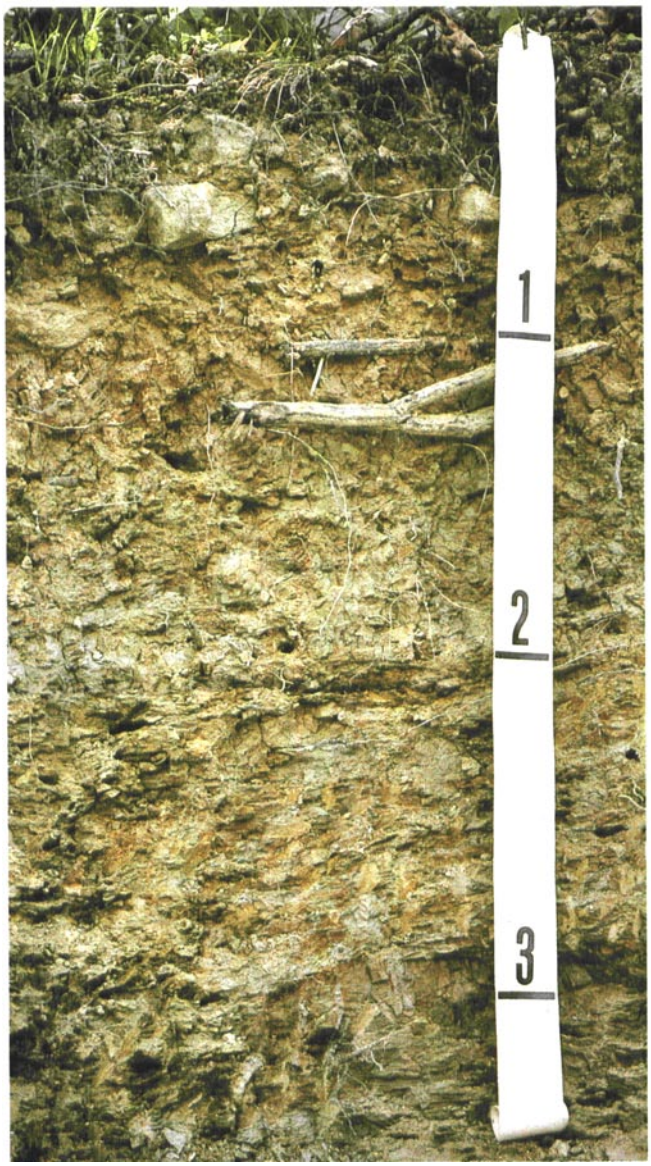


Figure 15.—Typical profile of Blairton silt loam. Blairton soils are moderately deep and have redoximorphic depletions with chroma of 2 or less within the upper 24 inches of the argillic horizon. Depth is marked in feet.

Figure 16.—Typical profile of Cloverlick very channery loam. Cloverlick soils are very deep, have a dark surface horizon, and have a high content of rock fragments of various sizes throughout. Depth is marked in feet.

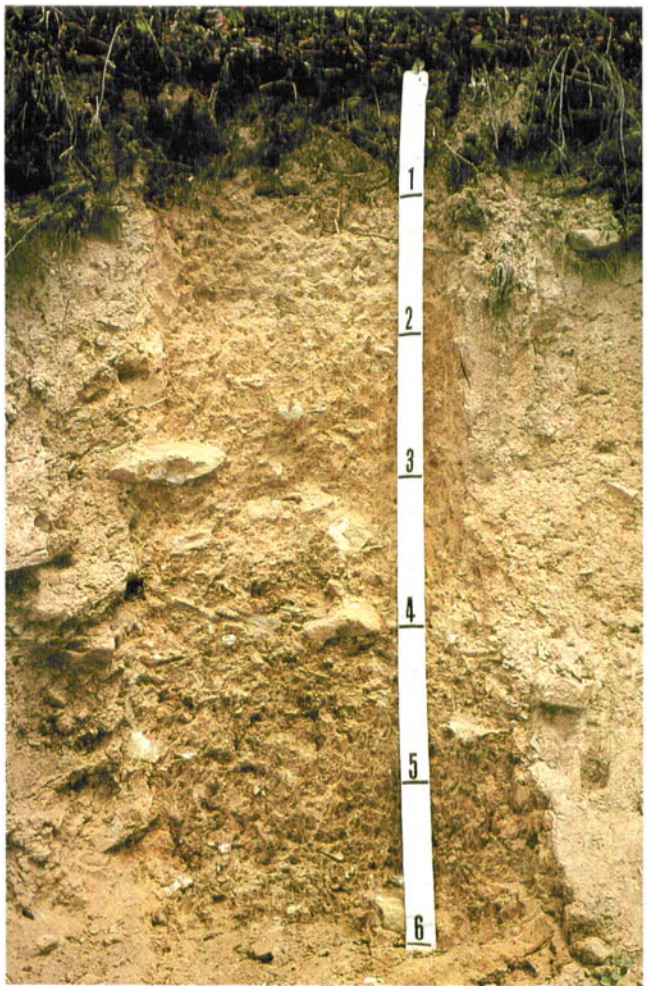


Figure 17.—Typical profile of Hazleton very channery sandy loam. Hazleton soils are very deep and have a high content of sand and rock fragments of various sizes throughout. Depth is marked in feet.

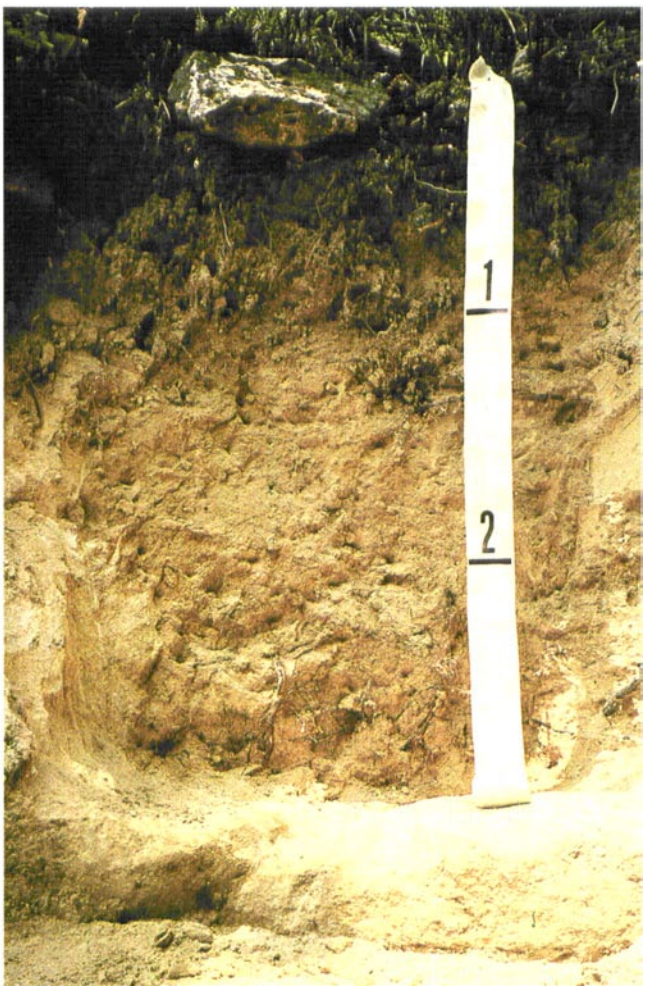


Figure 18.—Typical profile of Marrowbone sandy loam. Marrowbone soils are moderately deep and have a high content of sand throughout. Depth is marked in feet.

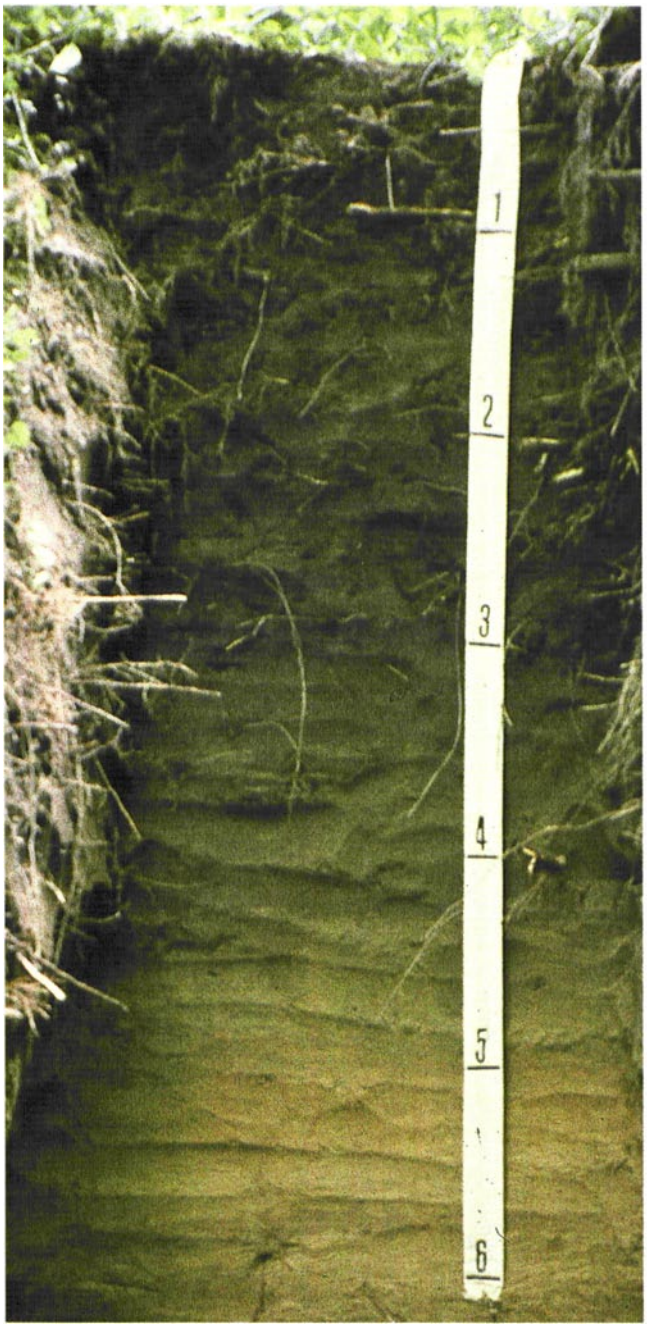


Figure 19.—Typical profile of Nelse fine sandy loam. Nelse soils are very deep, have a thick dark surface horizon, and are stratified. Depth is marked in feet.

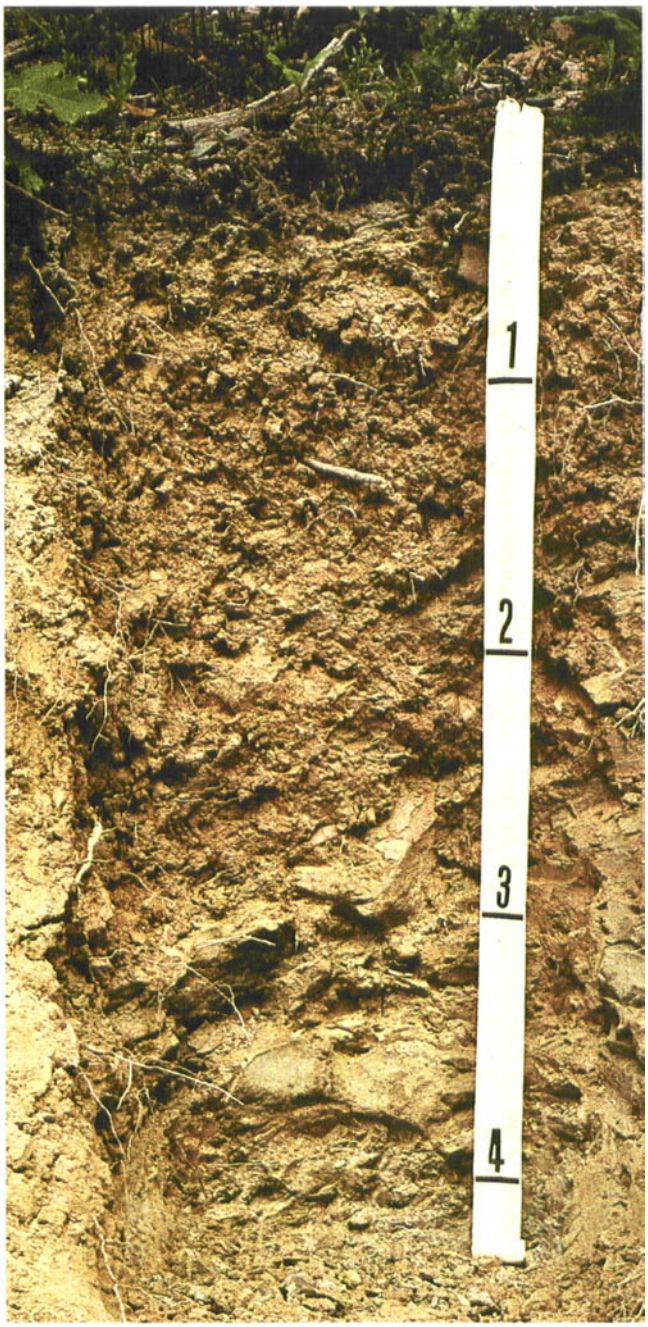


Figure 20.—Typical profile of Rayne loam. Rayne soils are deep. Depth is marked in feet.

- Nelse soils that are on banks of major streams and rivers
- Orrville soils that are somewhat poorly drained and fine-loamy

Typical Pedon

Grigsby fine sandy loam, frequently flooded; in Lawrence County; 4 miles east of Blaine on Kentucky Highway 32 to a bottom on the south side of Blaine Creek; USGS Mazie topographic quadrangle; lat. 38 degrees 00 minutes 56 seconds N. and long. 82 degrees 54 minutes 16 seconds W.

Ap—0 to 11 inches; brown (10YR 4/3) fine sandy loam, brown (10YR 5/3) dry; moderate fine and medium subangular blocky structure; friable; common fine roots; neutral; clear wavy boundary.

Bw1—11 to 19 inches; brown (10YR 4/3) sandy loam; moderate medium subangular blocky structure; friable; few fine roots; neutral; clear wavy boundary.

Bw2—19 to 32 inches; dark yellowish brown (10YR 4/4) fine sandy loam; moderate fine and medium subangular blocky structure; very friable; few fine roots; neutral; clear wavy boundary.

Bw3—32 to 54 inches; yellowish brown (10YR 5/4) fine sandy loam; moderate fine and medium subangular blocky structure; very friable; very few fine roots; neutral; gradual wavy boundary.

Bw4—54 to 64 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; slightly acid; clear wavy boundary.

BC—64 to 80 inches; yellowish brown (10YR 5/4) stratified loam and sandy loam; weak fine and medium subangular blocky structure; friable; few medium distinct light brownish gray (10YR 6/2) redoximorphic depletions; slightly acid.

Range in Characteristics

Solum thickness: 30 to 60 inches or more
Depth to bedrock: More than 60 inches
Kind and size of rock fragments: Sandstone and siltstone channers and pebbles
Reaction: Strongly acid to neutral

A or Ap horizon:
Hue—10YR
Value—4 or 5
Chroma—2 to 4
Texture of the fine-earth fraction—fine sandy loam
Rock fragment content—0 to 15 percent

Bw horizon:
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—3 to 6
Texture of the fine-earth fraction—loam, silt loam, fine sandy loam, or sandy loam
Rock fragment content—0 to 15 percent

BC, CB, or C horizon:
Hue—10YR
Value—4 to 6
Chroma—4 to 6
Texture of the fine-earth fraction—loam, fine sandy loam, sandy loam, or loamy fine sand
Rock fragment content—0 to 60 percent
Other characteristics—horizon is commonly stratified

Hayter Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Mountains
Parent material: Loamy alluvium and colluvial material from sandstone, siltstone, and shale
Slope range: 2 to 15 percent
Taxonomic class: Fine-loamy, mixed, mesic Ultic Hapludalfs

Associated Soils

- Allegheny soils that are on the broader terraces of the major streams and rivers
- Chagrin soils that are on flood plains
- Cotaco soils that are somewhat poorly drained
- Grigsby soils that are coarse-loamy and on flood plains
- Holly soils that are poorly drained and on flood plains
- Nelse soils that are coarse-loamy and on banks of major streams and rivers
- Orrville soils that are somewhat poorly drained and on flood plains

Typica'l Pedon

Hayter loam in an area of Hayter-Grigsby complex, 2 to 15 percent slopes; in Lawrence County; 11 miles north of Louisa on U.S. Highway 23 to the junction of Kentucky Highway 707 at Buchanan, 1.5 miles west on Kentucky Highway 707 to its intersection with Kentucky Highway 1937, about 1.25 miles northwest on Kentucky Highway 1937 to the Mt. Zion Church, 0.5 mile west on McIntier Branch to the first hollow on the south side of the creek, 700 feet south on a terrace; USGS Boltsfork topographic quadrangle; lat. 38 degrees 15 minutes 15 seconds N. and long. 82 degrees 39 minutes 51 seconds W.

Ap—0 to 10 inches; dark brown (10YR 3/3) loam, brown (10YR 4/3) dry; weak fine and medium subangular blocky structure; friable; many fine roots; 5 percent sandstone channers; neutral; abrupt wavy boundary.
Bt1—10 to 21 inches; dark yellowish brown (10YR 4/4) loam; moderate fine and medium subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds and in pores; 5 percent sandstone channers; neutral; clear smooth boundary.
Bt2—21 to 46 inches; yellowish brown (10YR 5/4) loam; moderate fine and medium subangular blocky structure; friable; very few fine roots; many distinct clay films on faces of peds and in pores; many medium faint yellowish brown (10YR 5/4) redoximorphic concentrations; 5 percent sandstone channers; slightly acid; clear smooth boundary.
Bt3—46 to 70 inches; dark yellowish brown (10YR 4/4) channery clay loam; moderate fine and medium subangular blocky structure; firm; very few fine roots; many distinct clay films on faces of peds and in pores; many medium faint light brownish gray (10YR 6/2) redoximorphic depletions; 20 percent sandstone channers; slightly acid; clear smooth boundary.
BC—70 to 80 inches; dark yellowish brown (10YR 4/4) very channery clay loam; weak medium subangular blocky structure; firm; many medium faint light brownish gray (10YR 6/2) redoximorphic depletions; 40 percent sandstone channers; slightly acid.

Range in Characteristics

Solum thickness: 40 to 60 inches or more
Depth to bedrock: More than 60 inches
Kind and size of rock fragments: Sandstone, siltstone, and shale channers and pebbles
Reaction: Strongly acid to slightly acid

A or Ap horizon:
Hue—7.5YR or 10YR
Value—3 to 6
Chroma—2 to 6
Texture of the fine-earth fraction—loam
Rock fragment content—0 to 15 percent

AB or BA horizon (if it occurs):
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—4 to 8
Texture of the fine-earth fraction—fine sandy loam or loam
Rock fragment content—0 to 40 percent

Bt horizon:
Hue—5YR to 10YR
Value—4 or 5
Chroma—4 to 8
Texture of the fine-earth fraction—loam, sandy clay loam, or clay loam
Rock fragment content—0 to 40 percent

BC, CB, or C horizon:
Hue—5YR to 10YR
Value—4 to 8
Chroma—0 to 8
Texture of the fine-earth fraction—loam, sandy clay loam, or clay loam
Rock fragment content—25 to 90 percent

Hazleton Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid or rapid
Landform: Mountains
Parent material: Colluvium from interbedded sandstone and siltstone
Slope range: 30 to 80 percent
Taxonomic class: Loamy-skeletal, mixed, mesic Typic Dystrochrepts

Associated Soils

- Beech soils that are fine-loamy
- Cloverlick soils that have a dark surface layer
- Fairpoint, Fiveblock, and Kaymine soils that are in surface mined areas
- Fedscreek soils that are coarse-loamy
- Rigley soils that are coarse-loamy and associated with the Lee Geologic Formation
- Shelocta soils that are fine-loamy
- Vandalia soils that are fine

Typical Pedon

Hazleton very channery sandy loam in an area of Hazleton-Shelocta-Fedscreek complex, 30 to 80 percent slopes, very stony (fig. 17); in Martin County; 7 miles southwest of Inez on Kentucky Highway 3 to Wolf Creek Road, 3 miles south to an intermittent drain between Right Fork and Straight Fork of Panther Fork of Wolf Creek, on a middle, warm colluvial side slope; USGS Thomas topographic quadrangle; lat. 37 degrees 44 minutes 27 seconds N. and long. 82 degrees 34 minutes 27 seconds W.

Oa—0 to 1 inch; highly decomposed hardwood leaf litter.
A—1 to 3 inches; very dark grayish brown (10YR 3/2) very channery sandy loam, dark grayish brown

(10YR 4/2) dry; weak fine granular structure; very friable; many fine roots; 40 percent sandstone channers; moderately acid; abrupt wavy boundary.

Bw1—3 to 8 inches; light yellowish brown (10YR 6/4) channery sandy loam; moderate fine and medium subangular blocky structure; friable; many fine, medium, and coarse roots; 35 percent sandstone channers and flagstones; strongly acid; clear wavy boundary.

Bw2—8 to 20 inches; brownish yellow (10YR 6/6) extremely channery sandy loam; moderate fine and medium subangular blocky structure; friable; many fine, medium, and coarse roots; 70 percent sandstone channers and flagstones; very strongly acid; clear wavy boundary.

Bw3—20 to 41 inches; brownish yellow (10YR 6/6) extremely channery sandy loam; moderate fine and medium subangular blocky structure; firm; common fine, medium, and coarse roots; 70 percent sandstone channers and flagstones; very strongly acid; gradual smooth boundary.

Bw4—41 to 80 inches; yellowish brown (10YR 5/4) extremely channery sandy loam; weak medium subangular blocky structure; firm; few fine roots; 70 percent sandstone channers and flagstones; very strongly acid.

Range in Characteristics

Solum thickness: 25 to 50 inches or more
Depth to bedrock: More than 60 inches
Kind and size of rock fragments: Sandstone and siltstone channers and flagstones
Reaction: Extremely acid to strongly acid

A or Ap horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture of the fine-earth fraction—sandy loam
Rock fragment content—5 to 40 percent

E horizon (if it occurs):
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture of the fine-earth fraction—fine sandy loam, sandy loam, or loam
Rock fragment content—5 to 40 percent

Bw horizon (upper part):
Hue—5YR to 10YR
Value—4 to 6
Chroma—3 to 8
Texture of the fine-earth fraction—sandy loam or loam
Rock fragment content—15 to 70 percent

Bw horizon (lower part):
Hue—5YR to 10YR
Value—4 to 6
Chroma—3 to 8
Texture of the fine-earth fraction—sandy loam or loam
Rock fragment content—15 to 70 percent

BC, CB, or C horizon (if it occurs):
Hue—5YR to 10YR
Value—4 to 6
Chroma—3 to 8
Texture of the fine-earth fraction—sandy loam or loam
Rock fragment content—35 to 80 percent

Holly Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderately slow
Landform: Flood plains
Parent material: Loamy alluvium
Slope range: 0 to 2 percent
Taxonomic class: Fine-loamy, mixed, nonacid, mesic Typic Fluvaquents

Associated Soils

- Allegheny soils that are well drained and on stream terraces
- Chagrin soils that are well drained
- Cotaco soils that are somewhat poorly drained and on stream terraces
- Grigsby soils that are well drained and coarse-loamy
- Hayter soils that are well drained and on stream terraces and colluvial fans
- Nelse soils that are well drained, are coarse-loamy, and are on banks of major streams and rivers
- Orrville soils that are somewhat poorly drained

Typical Pedon

Holly silt loam, frequently flooded; in Lawrence County; 2.5 miles west of Blaine on Kentucky Highway 32 to the confluence of Lower Laurel Creek and Blaine Creek, 0.25 mile south along Lower Laurel Creek Road to a barn on the west side of the road, 1,300 feet southwest to an area in a bottom adjacent to the toeslope; USGS Mazie topographic quadrangle; lat. 38 degrees 00 minutes 59 seconds N. and long. 82 degrees 52 minutes 43 seconds W.

Ap—0 to 9 inches; dark gray (10YR 4/1) silt loam, gray (10YR 5/1) dry; moderate fine and medium subangular blocky structure; friable; common fine roots; many fine prominent yellowish red (5YR 4/6) redoximorphic concentrations; neutral; abrupt smooth boundary.

Bg—9 to 20 inches; gray (N 5/0) silt loam; weak fine and medium subangular blocky structure; firm; few fine roots; moderate medium prominent yellowish red (5YR 5/8) redoximorphic concentrations; slightly acid; abrupt wavy boundary.

Cg1—20 to 47 inches; light brownish gray (2.5Y 6/2) loam; massive; firm; very few fine roots; moderate medium prominent yellowish brown (10YR 5/8) redoximorphic concentrations; strongly acid; clear wavy boundary.

Cg2—47 to 61 inches; light brownish gray (2.5Y 6/2) silt loam; massive; firm; very few fine roots; many medium prominent strong brown (7.5YR 5/8) redoximorphic concentrations; strongly acid; clear wavy boundary.

Cg3—61 to 80 inches; gray (N 6/0) silt loam; massive; very firm; many medium prominent strong brown (7.5YR 5/8) redoximorphic concentrations; moderately acid.

Range in Characteristics

Solum thickness: 20 to 44 inches
Depth to bedrock: More than 60 inches
Redoximorphic depletions with chroma of 2 or less: Dominant in all horizons between a depth of 10 and 30 inches
Kind and size of rock fragments: Sandstone and siltstone pebbles and gravel
Reaction: Strongly acid to slightly alkaline

A or Ap horizon:
Hue—10YR
Value—2 to 4 (6 or more dry)
Chroma—1 or 2
Texture of the fine-earth fraction—silt loam
Rock fragment content—0 to 10 percent

Bg horizon:
Hue—10YR to 5Y or neutral
Value—4 to 6
Chroma—2 or less
Texture of the fine-earth fraction—silt loam, loam, sandy loam, or silty clay loam
Rock fragment content—0 to 15 percent

Cg horizon:
Hue—10YR to 5Y or neutral
Value—4 to 6
Chroma—2 or less
Texture of the fine-earth fraction—generally silt loam, loam, or sandy loam; below a depth of 40 inches horizon may be stratified with loamy sand or sand
Rock fragment content—0 to 25 percent

Kaymine Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate or moderately rapid
Landform: Mountains
Parent material: Weathered regolith; bedrock fragments of interbedded sandstone, siltstone, shale, and coal created from surface mining for coal
Slope range: 0 to 80 percent
Taxonomic class: Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents

Associated Soils

- Blairton soils that are moderately deep and fine-loamy
- Cloverlick soils that have a dark surface layer
- Cruze soils that are deep and clayey
- Dekalb soils that are moderately deep
- Fedscreek soils that are fine-loamy
- Fairpoint soils that have moderately slow permeability
- Hazleton soils that are Inceptisoils
- Fiveblock soils that contain less than 18 percent clay in their particle-size control section and are somewhat excessively drained
- Marrowbone soils that are moderately deep and coarse-loamy
- Shelocta soils that are fine-loamy
- Rayne soils that are fine-loamy

Typical Pedon

Kaymine channery loam in an area of Fiveblock, Fairpoint, and Kaymine soils, 30 to 80 percent slopes, stony; in Martin County; 3.25 miles southeast of Lovely on Kentucky Highway 292 to mine #4 entrance of Wolf Creek Colliers property, 4 miles southeast on a surface mine road that runs along a ridge through Wolf Creek Colliers property; USGS Naugatuck topographic quadrangle; lat. 37 degrees 45 minutes 23 seconds N. and long. 82 degrees 21 minutes 53 seconds W.

Ap—0 to 6 inches; brown (10YR 4/3) very channery loam, brown (10YR 5/3) dry; common medium distinct gray (N 5/0) lithochromic mottles; weak fine and medium granular structure; friable; many

fine roots; 35 percent sandstone and shale channers; slightly acid; clear wavy boundary.
C1—6 to 15 inches; dark grayish brown (2.5Y 4/2) extremely channery loam; massive; very firm; few fine roots; 75 percent sandstone and shale channers and flagstones; slightly acid; gradual wavy boundary.
C2—15 to 23 inches; grayish brown (2.5Y 5/2) extremely channery loam; massive; very firm; 80 percent sandstone and shale channers and flagstones; neutral; gradual wavy boundary.
C3—23 to 46 inches; grayish brown (2.5Y 5/2) extremely flaggy loam; massive; very firm; 85 percent sandstone and shale channers and flagstones; neutral; gradual wavy boundary.
C4—46 to 80 inches; dark grayish brown (2.5Y 4/2) extremely flaggy loam; massive; very firm; 90 percent sandstone and shale channers and flagstones; neutral.

Range in Characteristics

Solum thickness: 0 to 20 inches
Depth to bedrock: More than 60 inches
Kind and size of rock fragments: Sandstone, siltstone, shale, and coal channers, flagstones, stones, and boulders
Reaction: Moderately acid to slightly alkaline

A or Ap horizon:
Hue—7.5YR, 10YR, or neutral
Value—3 to 5
Chroma—0 to 4
Texture of the fine-earth fraction—loam
Rock fragment content—15 to 35 percent

C horizon:
Hue—5YR to 5Y
Value—2 to 6
Chroma—1 to 8
Texture of the fine-earth fraction—loam or silt loam
Rock fragment content—15 to 90 percent

Marrowbone Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate or moderately rapid
Landform: Mountains
Parent material: Residuum weathered from sandstone and siltstone
Slope range: 6 to 80 percent
Taxonomic class: Coarse-loamy, mixed, mesic Typic Dystrochrepts

Associated Soils

- Blairton soils that are fine-loamy
- Cruze soils that are deep and clayey
- Dekalb soils that are loamy-skeletal
- Fairpoint, Fiveblock, and Kaymine soils that are in surface mined areas
- Rarden soils that are fine
- Upshur soils that are deep and fine
- Rayne soils that are deep and fine-loamy

Typical Pedon

Marrowbone sandy loam in an area of Rayne-Marrowbone-Dekalb complex, 20 to 80 percent slopes, very rocky (fig. 18); in Martin County; 9.5 miles west of Inez on Kentucky Highway 40 to the Johnson-Martin County line, 1.5 miles southwest on a county road that runs down the Johnson-Martin County line to an unimproved surface mine road, 1 mile east along the unimproved surface mine road, on a ridge; USGS Offutt topographic quadrangle; lat. 37 degrees 50 minutes 10 seconds N. and long. 82 degrees 50 minutes 10 seconds W.

A—0 to 4 inches; brown (10YR 5/3) sandy loam, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; many fine and medium roots; 5 percent sandstone channers; very strongly acid; abrupt smooth boundary.
Bw1—4 to 10 inches; light yellowish brown (10YR 6/4) channery sandy loam; weak fine and medium subangular blocky structure; friable; many fine and medium roots; 15 percent sandstone channers; very strongly acid; clear smooth boundary.
Bw2—10 to 23 inches; brownish yellow (10YR 6/6) channery sandy loam; weak fine and medium subangular blocky structure; friable; many fine, medium, and coarse roots; 15 percent sandstone channers; strongly acid; clear smooth boundary.
Bw3—23 to 35 inches; yellowish brown (10YR 5/6) channery sandy loam; moderate medium subangular blocky structure; friable; common fine and medium roots; 25 percent sandstone channers; very strongly acid; abrupt smooth boundary.
Cr—35 to 40 inches; highly weathered sandstone that can be excavated.
R—40 inches; sandstone bedrock.

Range in Characteristics

Solum thickness: 20 to 40 inches
Depth to bedrock: 20 to 40 inches

Kind and size of rock fragments: Sandstone and siltstone channers and flagstones
Reaction: Very strongly acid to neutral

A horizon:
Hue—7.5YR to 2.5Y
Value—3 to 5
Chroma—2 to 4
Texture of the fine-earth fraction—sandy loam
Rock fragment content—5 to 15 percent

AB or BA horizon (if it occurs):
Hue—7.5YR to 2.5Y
Value—4 to 6
Chroma—4 to 6
Texture of the fine-earth fraction—sandy loam, loam, or fine sandy loam
Rock fragment content—5 to 20 percent

E horizon (if it occurs):
Hue—7.5YR to 2.5Y
Value—4 to 6
Chroma—4 to 6
Texture of the fine-earth fraction—sandy loam, loam, or fine sandy loam
Rock fragment content—5 to 35 percent

Bw horizon (upper part):
Hue—7.5YR to 2.5Y
Value—4 to 6
Chroma—3 to 8
Texture of the fine-earth fraction—sandy loam, loam, or fine sandy loam
Rock fragment content—5 to 35 percent

Bw horizon (lower part):
Hue—7.5YR to 2.5Y
Value—4 to 6
Chroma—3 to 8
Texture of the fine-earth fraction—sandy loam, loam, or fine sandy loam
Rock fragment content—5 to 45 percent

BC, CB, or C horizon (if it occurs):
Hue—7.5YR to 2.5Y
Value—4 to 6
Chroma—3 to 8
Texture of the fine-earth fraction—sandy loam, loam, fine sandy loam, clay loam, or silt loam
Rock fragment content—5 to 45 percent

Nelse Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid or rapid
Landform: Flood plains
Parent material: Recent alluvium
Slope range: 4 to 25 percent
Taxonomic class: Coarse-loamy, mixed, nonacid, mesic Mollic Udifluvents

Associated Soils

- Allegheny soils that are fine-loamy and on stream terraces
- Chagrin soils that are fine-loamy and on flood plains
- Cotaco soils that are somewhat poorly drained and on stream terraces
- Grigsby soils that are coarse-loamy and on flood plains
- Hayter soils that are well drained and on stream terraces and colluvial fans
- Holly soils that are poorly drained and on flood plains
- Orrville soils that are somewhat poorly drained and on flood plains

Typical Pedon

Nelse fine sandy loam, 4 to 25 percent slopes, frequently flooded (fig. 19); in Martin County; 7.75 miles southeast of Lovely on Kentucky Highway 292 to the confluence of the Left Fork of Mt. Sterling Branch and the Tug Fork of the Big Sandy River, on a river bank; USGS Naugatuck topographic quadrangle; lat. 37 degrees 45 minutes 51 seconds N. and long. 82 degrees 20 minutes 01 second W.

A—0 to 12 inches; very dark grayish brown (10YR 3/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure parting to moderate medium granular; very friable; common fine and medium roots; moderately alkaline; abrupt smooth boundary.

C1—12 to 20 inches; stratified dark brown (10YR 3/3), dark grayish brown (10YR 4/2, dry), and yellowish brown (10YR 5/4) fine sandy loam and sandy loam; single grained; loose; very friable; common fine and medium roots; 3 percent coal flecks; moderately alkaline; abrupt smooth boundary.

C2—20 to 32 inches; stratified dark brown (10YR 4/3) and dark grayish brown (10YR 4/2) fine sandy loam; single grained; loose; very friable; few fine, medium, and coarse roots; 2 percent coal flecks; moderately alkaline; abrupt smooth boundary.

C3—32 to 44 inches; stratified very dark grayish brown (10YR 3/2) and dark brown (10YR 4/3) loam and fine sandy loam; single grained; loose; very friable; few fine, medium, and coarse roots; common medium prominent reddish brown (5YR 4/4) redoximorphic concentrations; 2 percent coal flecks; neutral; abrupt smooth boundary.

C4—44 to 55 inches; stratified very dark grayish brown (10YR 3/2) and dark brown (10YR 4/3) fine sandy loam and sandy loam; single grained; loose; very friable; few fine and medium roots; common medium prominent reddish brown (5YR 4/4) redoximorphic concentrations; 2 percent coal flecks; slightly acid; abrupt smooth boundary.
C5—55 to 80 inches; stratified very dark grayish brown (10YR 3/2) and yellowish brown (10YR 5/4) fine sandy loam and sandy loam; single grained; loose; very friable; very few fine and medium roots; common medium prominent reddish brown (5YR 4/4) redoximorphic concentrations; 2 percent coal flecks; slightly acid.

Range in Characteristics

Solum thickness: 0 to 20 inches
Depth to bedrock: More than 60 inches
Kind and size of rock fragments: Rounded or subrounded fragments or flecks of sandstone, siltstone, shale, and coal
Reaction: Strongly acid to moderately alkaline

A or Ap horizon:
Hue—10YR or 2.5Y
Value—2 to 5
Chroma—2 to 4
Texture of the fine-earth fraction—fine sandy loam
Rock fragment content—0 to 15 percent

BC, CB, or C horizon:
Hue—2.5Y or 10YR
Value—3 to 6
Chroma—2 to 6
Texture of the fine-earth fraction—typically silt loam, loam, fine sandy loam, sandy loam, loamy fine sand, or loamy sand; in some places horizon is stratified or has bedding planes of very fine sand to medium sand
Rock fragment content—0 to 15 percent

Orrville Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Landform: Flood plains
Parent material: Loamy alluvium
Slope range: 0 to 2 percent
Taxonomic class: Fine-loamy, mixed, nonacid, mesic Aeric Fluvaquents

Associated Soils

- Allegheny soils that are on stream terraces
- Chagrin soils that are well drained
- Cotaco soils that are somewhat poorly drained and on stream terraces
- Grigsby soils that are coarse-loamy and well drained
- Hayter soils that are well drained and on stream terraces and colluvial fans
- Holly soils that are poorly drained
- Nelse soils that are well drained, are coarse-loamy, and are on banks of major streams and rivers

Typical Pedon

Orrville silt loam, frequently flooded; in Lawrence County; 6.5 miles northwest of Fallsburg on Kentucky Highway 3, about 500 feet west of Kentucky Highway 3 to a bottom on the East Fork of the Little Sandy River; USGS Fallsburg topographic quadrangle; lat. 38 degrees 13 minutes 42 seconds N. and long. 82 degrees 43 minutes 22 seconds W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; common fine roots; neutral; clear wavy boundary.
Bw—10 to 16 inches; brown (10YR 5/3) silt loam; moderate fine and medium subangular blocky structure; friable; few fine roots; common medium distinct grayish brown (10YR 5/2) redoximorphic depletions; neutral; clear wavy boundary.
Bg—16 to 30 inches; grayish brown (10YR 5/2) silt loam; weak fine and medium subangular blocky structure; firm; very few fine roots; common medium prominent strong brown (7.5YR 4/6) redoximorphic concentrations; neutral; clear wavy boundary.
Cg1—30 to 46 inches; light brownish gray (10YR 6/2) clay loam; massive; firm; very few fine roots; many medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; neutral; clear wavy boundary.
Cg2—46 to 65 inches; light gray (N 7/0) clay loam; massive; firm; very few fine roots; many medium prominent strong brown (7.5YR 5/6) redoximorphic concentrations; 5 percent sandstone gravel; neutral; clear wavy boundary.
C—65 to 80 inches; strong brown (7.5YR 5/6) clay loam; massive; firm; many medium prominent gray (10YR 5/1) redoximorphic depletions; 10 percent sandstone gravel; neutral.

Range in Characteristics

Solum thickness: 24 to 50 inches
Depth to bedrock: More than 60 inches
Redoximorphic depletions with chroma of 2 or less: Dominant in one or more horizons between depths of 10 and 30 inches

Kind and size of rock fragments: Sandstone and siltstone gravel
Reaction: Strongly acid to neutral

A or Ap horizon:
Hue—10YR or 2.5Y
Value—2 to 4
Chroma—1 or 2
Texture of the fine-earth fraction—silt loam
Rock fragment content—0 to 5 percent

Bw horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—3 to 6
Texture of the fine-earth fraction—silt loam or loam
Rock fragment content—0 to 15 percent

Bg horizon:
Hue—10YR to 5Y or neutral
Value—4 to 6
Chroma—0 to 6
Texture of the fine-earth fraction—silt loam, loam, silty clay loam, or clay loam
Rock fragment content—0 to 15 percent

BC, CB, Cg, or C horizon:
Hue—10YR to 5Y or neutral
Value—4 to 7
Chroma—1 to 6
Texture of the fine-earth fraction—typically silt loam, clay loam, loam, or sandy loam; stratification is typical below a depth of 40 inches, and the texture is loamy sand or its gravelly analogues; thin layers of silty clay loam, clay loam, or stony material occur in some pedons
Rock fragment content—0 to 25 percent

Rarden Series

Depth class: Moderately deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Mountains
Parent material: Residuum from clay shale and interbedded siltstone
Slope range: 6 to 60 percent
Taxonomic class: Fine, mixed, mesic Aquulitic Hapludalfs

Associated Soils

- Blairton soils that are fine-loamy
- Cruze soils that are deep
- Dekalb soils that are loamy-skeletal
- Marrowbone soils that are coarse-loamy
- Upshur soils that are deep

Typical Pedon

Rarden silt loam in an area of Upshur-Rarden complex, 12 to 25 percent slopes; in Lawrence County; 13 miles north of Louisa on U.S. Highway 23 to the confluence of Bear Creek and the Big Sandy River at Buchanan, 1 mile west along Kentucky Highway 707 to a ridge 1,500 feet south of Bear Creek; USGS Fallsburg topographic quadrangle; lat. 38 degrees 15 minutes 55 seconds N. and long. 82 degrees 37 minutes 00 seconds W.

A—0 to 3 inches; brown (10YR 5/3) silt loam, pale brown (10YR 6/3) dry; moderate fine and medium granular structure; friable; common fine and medium roots; very strongly acid; abrupt smooth boundary.
Bt1—3 to 12 inches; dark reddish brown (2.5YR 3/4) silty clay; moderate fine and medium subangular blocky structure; firm; few fine roots; many distinct clay films on faces of peds and in pores; few fine prominent olive gray (5Y 5/2) redoximorphic depletions; very strongly acid; clear smooth boundary.
Bt2—12 to 16 inches; dark reddish brown (2.5YR 3/4) silty clay; strong fine and medium subangular blocky structure; firm; few fine and medium roots; many distinct clay films on faces of peds and in pores; common medium prominent olive gray (5Y 5/2) redoximorphic depletions; very strongly acid; clear smooth boundary.
Bt3—16 to 19 inches; dark reddish brown (2.5YR 3/4) silty clay; strong fine and medium subangular blocky structure; firm; many distinct clay films on faces of peds and in pores; many medium prominent light gray (N 7/0) redoximorphic depletions; very strongly acid; clear smooth boundary.
Bt4—19 to 26 inches; yellowish red (5YR 5/6) and light gray (5Y 7/1) silty clay; weak fine subangular blocky structure; firm; few fine clay films on faces of peds and in pores; 5 percent siltstone channers; very strongly acid; abrupt smooth boundary.
Cr—26 to 36 inches; siltstone bedrock that can be excavated.

Range in Characteristics

Solum thickness: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Depth to redoximorphic depletions with chroma of 2 or less: Within the upper 10 inches of the argillic horizon

Kind and size of rock fragments: Shale and siltstone channers
Reaction: Extremely acid to strongly acid

A or Ap horizon:
Hue—10YR or 7.5YR
Value—3 to 5
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam
Rock fragment content—0 to 15 percent

Bt horizon:
Hue—5YR, 2.5YR, or 7.5YR
Value—3 to 7
Chroma—4 to 8
Texture of the fine-earth fraction—silty clay, clay, or silty clay loam
Rock fragment content—0 to 15 percent

BC, CB, or C horizon (if it occurs):
Hue—5YR to 10YR
Value—5 or 6
Chroma—4 to 6
Texture of the fine-earth fraction—silty clay, clay, or silty clay loam
Rock fragment content—0 to 30 percent

Rayne Series

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Landform: Mountains
Parent material: Residuum from interbedded siltstone, shale, and fine-grained sandstone
Slope range: 20 to 80 percent
Taxonomic class: Fine-loamy, mixed, mesic Typic Hapludults

Associated Soils

- Blairton soils that are moderately deep
- Cruze soils that are clayey
- Dekalb soils that are moderately deep and loamy-skeletal
- Fairpoint, Fiveblock, and Kaymine soils that are in surface mined areas
- Marrowbone soils that are moderately deep and coarse-loamy

Typical Pedon

Rayne loam in an area of Rayne-Marrowbone-Dekalb complex, 20 to 80 percent slopes, very rocky (fig. 20); in Martin County; 3.5 miles east of Inez on Kentucky Highway 40 to the intersection of Kentucky Highway 40 and Kentucky Highway 2032, about 6.5 miles southwest on Kentucky Highway 2032 to Pilgrim, 2.5 miles southwest along Emily Creek to a gravel road, 0.75 mile northwest along the road to a four-way intersection, right at the intersection, 0.45 mile south to Wolf Creek Collieries mine #4 guard house, 1.5 miles southwest on an unimproved mine road to a ridge between Long Branch and Mosey Branch; USGS Naugatuck topographic quadrangle; lat. 82 degrees 21 minutes 59 seconds N. and long. 37 degrees 45 minutes 51 seconds W.

A—0 to 3 inches; dark grayish brown (10YR 4/2) loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; very friable; common fine and medium roots; 5 percent sandstone channers; very strongly acid; abrupt smooth boundary.
BA—3 to 11 inches; yellowish brown (10YR 5/6) silt loam; moderate fine and medium subangular blocky structure; friable; many fine and medium roots; 10 percent sandstone channers; very strongly acid; clear wavy boundary.
Bt1—11 to 20 inches; strong brown (7.5YR 5/8) channery silty clay loam; moderate medium subangular blocky structure; firm; common fine and medium roots; common distinct clay films on faces of peds; 15 percent siltstone channers; very strongly acid; gradual smooth boundary.
Bt2—20 to 30 inches; strong brown (7.5YR 5/8) silty clay loam; common medium prominent light gray (2.5Y 7/2) lithochromic mottles; moderate fine and medium subangular blocky structure; firm; few fine and medium roots; many distinct clay films on faces of peds; 10 percent siltstone channers; very strongly acid; gradual smooth boundary.
Bt3—30 to 37 inches; strong brown (7.5YR 5/8) silty clay loam; many medium prominent light gray (2.5Y 7/2) lithochromic mottles; moderate fine and medium subangular blocky structure; firm; very few fine roots; many distinct clay films on faces of peds; 5 percent siltstone channers; strongly acid; abrupt smooth boundary.
C—37 to 49 inches; strong brown (7.5YR 5/8) very channery silty clay loam; many medium prominent light gray (2.5Y 7/2) lithochromic mottles; massive; firm; few fine roots; 35 percent siltstone channers; strongly acid; clear wavy boundary.
Cr—49 to 59 inches; highly weathered siltstone that can be excavated.

Range in Characteristics

Solum thickness: 30 to 60 inches

Depth to bedrock: 40 to 60 inches
Kind and size of rock fragments: Siltstone, shale, and fine-grained sandstone channers
Reaction: Very strongly acid or strongly acid

A or Ap horizon:
Hue—10YR
Value—3 to 5
Chroma—2 to 4
Texture of the fine-earth fraction—loam
Rock fragment content—0 to 15 percent

AB, BA, or E horizon (if it occurs):
Hue—7.5YR or 10YR
Value—5 or 6
Chroma—2 to 8
Texture of the fine-earth fraction—silt loam or loam
Rock fragment content—0 to 40 percent

Bt horizon (upper part):
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—4 to 8
Texture of the fine-earth fraction—loam, silt loam, or silty clay loam
Rock fragment content—0 to 40 percent; the average content of rock fragments in the particle-size control section is less than 35 percent

Bt horizon (lower part):
Hue—5YR to 10YR
Value—4 or 5
Chroma—4 to 8
Texture of the fine-earth fraction—loam, silt loam, or silty clay loam
Rock fragment content—0 to 40 percent; the average content of rock fragments in the particle-size control section is less than 35 percent

BC, CB, or C horizon:
Hue—5YR to 2.5Y
Value—4 or 5
Chroma—4 to 8
Texture of the fine-earth fraction—sandy loam to silty clay loam
Rock fragment content—15 to 90 percent

Rigley Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Mountains
Parent material: Colluvium from sandstone
Slope range: 30 to 70 percent
Taxonomic class: Coarse-loamy, mixed, mesic Typic Hapludults

Associated Soils

- Fedscreek soils that do not have an argillic horizon
- Hazleton soils that are loamy-skeletal
- Shelocta soils that are fine-loamy

Typical Pedon

Rigley fine sandy loam in an area of Rigley-Rock outcrop complex, 30 to 70 percent slopes; in Lawrence County; 4.25 miles south of Blaine on Kentucky Highway 201, about 500 feet east of Kentucky Highway 201 to the bank of Hood Creek; USGS Sitka topographic quadrangle; lat. 37 degrees 58 minutes 22 seconds N. and long. 82 degrees 49 minutes 44 seconds W.

A—0 to 6 inches; brown (10YR 4/3) fine sandy loam, brown (10YR 5/3) dry; weak fine and medium granular structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

BA—6 to 11 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure parting to weak fine and medium granular; very friable; many fine and medium roots; very strongly acid; gradual smooth boundary.

Bt1—11 to 21 inches; yellowish brown (10YR 5/6) sandy loam; moderate medium subangular blocky structure; friable; few fine, medium, and coarse roots; common distinct clay bridging between sand grains; very strongly acid; clear smooth boundary.

Bt2—21 to 28 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; friable; few fine, medium, and coarse roots; common distinct clay bridging between sandy grains; very strongly acid; gradual smooth boundary.

Bt3—28 to 42 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; very friable; few fine, medium, and coarse roots; common distinct clay bridging between sand grains; very strongly acid; gradual smooth boundary.

Bt4—42 to 53 inches; yellowish brown (10YR 5/8) sandy loam; weak medium subangular blocky structure; very friable; few fine and medium roots; common distinct clay bridging between sand grains; very strongly acid; clear smooth boundary.

BC—53 to 60 inches; yellowish brown (10YR 5/6)

sandy loam; common medium faint (10YR 5/4) lithochromic mottles; weak coarse subangular blocky structure; very friable; few fine and medium roots; very strongly acid; clear smooth boundary.
C—60 to 80 inches; yellowish brown (10YR 5/6) sandy loam; single grained; very friable; very few fine roots; very strongly acid.

Range in Characteristics

Solum thickness: 40 to 60 inches
Depth to bedrock: More than 60 inches
Kind and size of rock fragments: Sandstone pebbles, cobbles, and channers and quartz pebbles
Reaction: Extremely acid to neutral

Ap horizon (if it occurs):
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 4
Texture of the fine-earth fraction—fine sandy loam
Rock fragment content—5 to 15 percent

A horizon:
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—2 or 3
Texture of the fine-earth fraction—fine sandy loam
Rock fragment content—5 to 17 percent

AB or BA horizon (if it occurs):
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—4 to 6
Texture of the fine-earth fraction—sandy loam, fine sandy loam, or loam
Rock fragment content—5 to 35 percent

Bt horizon:
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—4 to 8
Texture of the fine-earth fraction—sandy loam or loam
Rock fragment content—5 to 35 percent

BC, CB, or C horizon:
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—4 to 8
Texture of the fine-earth fraction—sandy loam, loam, sandy clay loam, or clay loam

Shelocta Series

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Landform: Mountains
Parent material: Mixed colluvium and residuum from acid shale, siltstone, and sandstone
Slope range: 2 to 80 percent
Taxonomic class: Fine-loamy, mixed, mesic Typic Hapludults

Associated Soils

- Beech soils that are moderately well drained
- Cloverlick soils that have a dark surface layer
- Fairpoint, Fiveblock, and Kaymine soils that are in surface mined areas
- Fedscreek soils that are coarse-loamy
- Hazleton soils that are loamy-skeletal
- Rigley soils that are associated with the Lee Geologic Formation and are coarse-loamy
- Vandalia soils that are fine

Typical Pedon

Shelocta silt loam in an area of Hazleton-Shelocta-Fedscreek complex, 30 to 80 percent slopes, very stony; in Martin County; 2.75 miles southwest of Lovely along Wolf Creek on Kentucky Highway 1714 to Pilgrim, 2 miles southeast along Emily Creek, on a lower, warm colluvial side slope; USGS Kermit topographic quadrangle; lat. 37 degrees 47 minutes 11 seconds N. and long. 82 degrees 23 minutes 47 seconds W.

A—0 to 3 inches; brown (10YR 4/3) silt loam, brown (10YR 5/3) dry; moderate fine and medium granular structure; very friable; many fine, medium, and coarse roots; 5 percent sandstone channers; neutral; abrupt wavy boundary.
Bt1—3 to 7 inches; yellowish brown (10YR 5/6) silt loam; moderate fine and medium subangular blocky structure; friable; many fine, medium, and coarse roots; common distinct clay films on faces of peds and in root channels; 5 percent sandstone channers; strongly acid; clear wavy boundary.
Bt2—7 to 15 inches; dark yellowish brown (10YR 4/6) silt loam; moderate medium subangular blocky structure; friable; common fine and medium roots; many distinct clay films on faces of peds and in root channels; 10 percent sandstone channers; very strongly acid; clear wavy boundary.
Bt3—15 to 25 inches; strong brown (7.5YR 5/6) channery silt loam; moderate medium subangular blocky structure; firm; common fine and medium roots; many distinct clay films on faces of peds; 15 percent sandstone channers; very strongly acid; clear wavy boundary.
Bt4—25 to 39 inches; strong brown (7.5YR 4/6) channery silt loam; moderate medium subangular blocky structure; firm; few fine, medium, and

coarse roots; many distinct clay films on faces of peds; 15 percent sandstone and siltstone channers; very strongly acid; clear wavy boundary.

Bt5—39 to 51 inches; strong brown (7.5YR 4/6) very channery silt loam; weak fine and medium subangular blocky structure; firm; very few fine roots; few faint clay films on faces of peds; 45 percent siltstone and sandstone channers; very strongly acid; abrupt wavy boundary.

Cr—51 to 61 inches; fractured siltstone that can be excavated.

Range in Characteristics

Solum thickness: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Depth to redoximorphic depletions with chroma of 2 or less: Below the upper 40 inches of the argillic horizon
Kind and size of rock fragments: Siltstone, shale, and sandstone channers
Reaction: Extremely acid to slightly acid

A or Ap horizon:
Hue—10YR
Value—3 to 5
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam
Rock fragment content—2 to 15 percent

AB, BA, or BE horizon (if it occurs):
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—4 to 6
Texture of the fine-earth fraction—silt loam or loam
Rock fragment content—5 to 15 percent

Bt horizon (upper part):
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—4 to 8
Texture of the fine-earth fraction—silt loam, loam, or silty clay loam; however, loam texture is not permitted throughout the Bt horizon
Rock fragment content—5 to 35 percent

Bt horizon (lower part):
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—4 to 6
Texture of the fine-earth fraction—silt loam, silty clay loam, or clay loam
Rock fragment content—5 to 45 percent
Other characteristics—redoximorphic depletions and redoximorphic concentrations in shades of gray and brown

BC, CB, or C horizon (if it occurs):
Hue—7.5YR to 2.5Y
Value—4 to 6
Chroma—2 to 6
Texture of the fine-earth fraction—silt loam, silty clay loam, or loam
Rock fragment content—15 to 90 percent
Other characteristics—redoximorphic depletions and redoximorphic concentrations in shades of gray and brown

Upshur Series

Depth class: Deep
Drainage class: Well drained
Permeability: Slow
Landform: Mountains
Parent material: Residuum from clay shale and interbedded siltstone
Slope range: 6 to 60 percent
Taxonomic class: Fine, mixed, mesic Typic Hapludalfs

Associated Soils

- Blairton soils that are moderately deep, moderately well drained, and fine-loamy
- Cruze soils that are moderately well drained
- Dekalb soils that are moderately deep and loamy-skeletal
- Rarden soils that are moderately deep
- Marrowbone soils that are moderately deep and coarse-loamy
- Rayne soils that are moderately well drained and fine-loamy

Typical Pedon

Upshur silty clay loam in an area of Upshur-Rarden complex, 12 to 25 percent slopes; in Lawrence County; 7 miles north of Louisa on U.S. Highway 23, along a gravel road on the west side of U.S. Highway 23 which runs alongside of a "hollow-fill," to the ridge; USGS Prichard topographic quadrangle; lat. 38 degrees 13 minutes 31 seconds N. and long. 82 degrees 36 minutes 59 seconds W.

A—0 to 3 inches; brown (10YR 4/3) silty clay loam, brown (10YR 5/3) dry; moderate fine and medium subangular blocky structure; friable; many fine and medium roots; strongly acid; abrupt wavy boundary.

Bt1—3 to 7 inches; dark reddish brown (5YR 3/4)

clay; strong fine and medium subangular blocky structure; firm; common fine and medium roots; many distinct clay films on faces of peds and in pores; strongly acid; gradual smooth boundary.

Bt2—7 to 18 inches; dark reddish brown (2.5YR 3/4) silty clay; moderate medium prismatic structure parting to strong medium subangular blocky; very firm; common fine and medium roots; many distinct clay films on faces of peds and in pores; strongly acid; gradual smooth boundary.

Btk—18 to 30 inches; dark reddish brown (2.5YR 3/4) silty clay; many medium prominent olive (5Y 5/4) lithochromic mottles; moderate fine and medium granular structure; very firm; common fine roots; common distinct clay films on faces of peds and in pores; few fine rounded hard carbonate nodules in the upper part of the horizon; 5 percent siltstone channers; moderately alkaline; clear wavy boundary.

BCk—30 to 42 inches; dusky red (10R 3/3) very channery silty clay loam; many medium prominent olive (5Y 5/4) lithochromic mottles; weak fine and medium subangular blocky structure; firm; fine roots; few distinct clay films on faces of peds and in pores; common fine rounded hard carbonate nodules in the upper part of the horizon; 40 percent siltstone channers; moderately alkaline; clear wavy boundary.

C—42 to 52 inches; dusky red (10R 3/3) extremely channery silty clay loam; many medium prominent olive (5Y 5/4) lithochromic mottles; massive; firm; very few fine roots; 90 percent siltstone channers; moderately alkaline; abrupt wavy boundary.

Cr—52 to 62 inches; siltstone bedrock that can be excavated.

Range in Characteristics

Solum thickness: 26 to 50 inches
Depth to bedrock: 40 to 60 inches
Kind and size of rock fragments: Siltstone and shale channers
Reaction: Very strongly acid to moderately alkaline

A or Ap horizon:
Hue—2.5YR to 10YR
Value—2 to 4
Chroma—2 to 4
Texture of the fine-earth fraction—silty clay loam
Rock fragment content—0 to 15 percent

Bt horizon (upper part):
Hue—10R to 5YR
Value—3 or 4
Chroma—3 to 6
Texture of the fine-earth fraction—silty clay or clay
Rock fragment content—0 to 15 percent

Bt horizon (lower part):
Hue—10R to 5YR
Value—3 or 4
Chroma—3 to 6
Texture of the fine-earth fraction—silty clay or clay
Rock fragment content—0 to 25 percent

BC, CB, or C horizon:
Hue—10R to 5YR
Value—3 or 4
Chroma—3 to 6
Texture of the fine-earth fraction—silty clay loam, silty clay, clay, silt loam, or clay loam
Rock fragment content—0 to 90 percent

Vandalia Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow or slow
Landform: Mountains
Parent material: Colluvium from shale, siltstone, and sandstone
Slope range: 20 to 60 percent
Taxonomic class: Fine, mixed, mesic Typic Hapludalfs

Associated Soils

- Beech soils that are fine-loamy
- Fedscreek soils that are coarse-loamy
- Hazleton soils that are loamy-skeletal
- Shelocta soils that are fine-loamy

Typical Pedon

Vandalia loam in an area of Vandalia-Beech complex, 20 to 60 percent slopes, stony; in Lawrence County; 5 miles northwest of Louisa on Kentucky Highway 3 to Fallsburg, 0.75 mile northwest of Fallsburg on Kentucky Highway 3 to its intersection with Kentucky Highway 707, about 0.5 mile northeast along Kentucky Highway 707 to Long Branch, 2.5 miles northwest traveling up Long Branch to a side slope near the head of the hollow; USGS Fallsburg topographic quadrangle; lat. 38 degrees 12 minutes 32 seconds N. and long. 82 degrees 43 minutes 19 seconds W.

A—0 to 5 inches; dark yellowish brown (10YR 4/4) loam, yellowish brown (10YR 5/4) dry; weak fine and medium granular structure; friable; many fine and medium roots; 10 percent sandstone channers; strongly acid; abrupt wavy boundary.

Bt1—5 to 11 inches; strong brown (7.5YR 5/6) loam; moderate fine and medium subangular blocky structure; friable; common fine and medium roots; 5 percent sandstone and siltstone channers; strongly acid; clear wavy boundary.

2Bt2—11 to 18 inches; reddish brown (2.5YR 4/4) silty clay; strong fine and medium subangular blocky structure; firm; common fine, medium, and coarse roots; many distinct clay films on faces of peds and in pores; very strongly acid; clear smooth boundary.

2Bt3—18 to 22 inches; reddish brown (2.5YR 4/4) very channery clay; moderate fine subangular blocky structure; common fine and medium roots; common distinct clay films on faces of peds and in pores; 40 percent siltstone channers; very strongly acid; clear smooth boundary.

2Bt4—22 to 29 inches; dark reddish brown (2.5YR 3/4) clay; moderate medium subangular blocky structure; firm; common fine, medium, and coarse roots; many distinct clay films on faces of peds and in pores; 5 percent siltstone channers; very strongly acid; gradual smooth boundary.

2Bt5—29 to 36 inches; dark reddish brown (2.5YR 3/3) silty clay loam; common medium prominent brownish yellow (10YR 6/8) lithochromic mottles; moderate fine and medium subangular blocky structure; firm; common fine, medium, and coarse roots; common distinct clay films on faces of peds and in pores; strongly acid; gradual smooth boundary.

2Bt6—36 to 47 inches; dark reddish brown (2.5YR 3/3) silty clay loam; common medium prominent brownish yellow (10YR 6/8) lithochromic mottles; weak fine and medium subangular blocky structure; very firm; few fine and medium roots; few faint clay films on faces of peds and in pores; strongly acid; gradual smooth boundary.

2C1—47 to 54 inches; dark reddish brown (2.5YR 3/3) very channery silty clay loam; common medium prominent brownish yellow (10YR 6/8) lithochromic mottles; massive; very firm; few fine roots; 50 percent siltstone channers; strongly acid; gradual smooth boundary.

2C2—54 to 61 inches; dark reddish brown (2.5YR 3/3) very channery silty clay loam; common medium prominent brownish yellow (10YR 6/8) lithochromic mottles; massive; very firm; very few fine roots; 50 percent siltstone channers; slightly acid; gradual smooth boundary.

2C3—61 to 69 inches; mottled dark reddish brown (2.5YR 3/3), reddish yellow (7.5YR 6/8), and light yellowish brown (2.5Y 6/4) very channery silty clay loam; massive; firm; 50 percent siltstone channers; neutral; clear wavy boundary.

2Cr—69 to 79 inches; siltstone bedrock that can be excavated with difficulty.

Range in Characteristics

Solum thickness: 40 to 80 inches
Depth to bedrock: More than 60 inches
Kind and size of rock fragments: Shale, siltstone, and sandstone channers
Reaction: Very strongly acid to neutral

A or Ap horizon:
Hue—5YR to 10YR
Value—3 to 5
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam or loam
Rock fragment content—5 to 15 percent

AB or BA horizon (if it occurs) and the upper part of the Bt horizon:
Hue—2.5YR to 7.5YR
Value—4 or 5
Chroma—3 to 6
Texture of the fine-earth fraction—silty clay loam, loam, silt loam, clay loam, or silty clay
Rock fragment content—5 to 40 percent

2Bt horizon:
Hue—10R to 5YR
Value—3 or 4
Chroma—3 to 6
Texture of the fine-earth fraction—silty clay or clay
Rock fragment content—5 to 40 percent

2BC, 2CB, or 2C horizon:
Hue—10R to 5YR
Value—3 to 6
Chroma—3 to 6
Texture of the fine-earth fraction—silty clay loam, silty clay, clay loam, or clay
Rock fragment content—5 to 50 percent

Formation of the Soils

This section describes the factors of soil formation and how they relate to the soils in the survey area. It also discusses the processes of horizon differentiation.

Factors of Soil Formation

Soils are natural bodies on the earth's surface that exhibit unique features and properties. Soils form as certain horizons or layers develop in weathered parent material. Soil formation is determined by the interaction of parent material, topography, climate, living organisms, and time. The interaction of these five factors of soil formation results in the differences among soils *(7)*. The relative importance of each of these soil-forming factors differs from one soil to another. In some areas one factor may dominate. Because the interrelationship of the soil-forming factors is so complex, the affect of any one factor is difficult to determine. In Lawrence and Martin Counties, the differences in soil types are mainly due to the influences of parent material and topography (relief and landform position).

Parent Material

Parent material is the unconsolidated mass in which a soil forms. It is a product of the weathering, or decomposition, of underlying bedrock or transported materials. Parent material influences the chemical, mineral, and textural composition of a soil. In the early stages of soil formation, a soil has properties similar to those of the parent material. As weathering takes place, these properties are modified and each soil develops its own set of characteristics. Hazleton and Vandalia soils illustrate how the color, texture, and elemental composition of each soil is determined by the parent material. Hazleton soils formed in colluvial material weathered from acid gray, brown, or red sandstone. Vandalia soils formed in mixed colluvium weathered from shale, siltstone, and some sandstone. Hazleton soils are yellowish brown to strong brown and have a dominant texture of sandy loam. They are generally low in natural fertility because of the low amount of basic cations inherent in the parent material. Vandalia soils are reddish brown to dusky red and have a dominant texture of silty clay or clay. They are generally high in natural fertility because of the high amount of basic cations inherent in the parent material.

The general types of parent material in the survey area are residual material that weathered in place from rocks similar to those of the underlying bedrock, colluvial material moved by gravity from ridgetops and upper side slopes and deposited on the lower slopes, alluvium deposited on flood plains by overflowing streams, mine spoil created from surface mining for coal, and fill material created from local road construction and other types of soil disturbance.

Because of the dissected mountainous terrain, soils that formed completely in residual material are mainly located on the ridgetops and nose slopes. Most of the residual soils are moderately deep. The sandy Marrowbone soils are an example. They are underlain by fine-grained sandstone. They have a low content of clay and a high content of sand because of the weathering of the underlying sandstone. In many places the boundary between the soil and the underlying bedrock is very diffuse and may extend over a depth of a few feet.

Colluvial material dominantly occurs on the steeper side slopes. Most of the soils that formed in this material show some degree of mixing, at least in the upper part of the profile. In the typical pedon for Shelocta soils, differences in texture and in the orientation of rock fragments indicate that the upper part of the profile formed in colluvial material and the lower part formed in residual material. Cloverlick soils formed in very deep colluvial material near the base of the mountains and at the head of many drains.

Numerous areas of loamy colluvium occur as cone- or fan-shaped deposits called colluvial fans, at the mouth of dendritic drains. These deposits develop slowly over a period of time by alluvial or colluvial processes, or both. Other areas may result from debris avalanches *(48)*. Hazleton and Cloverlick soils formed in loamy colluvium.

Alluvial material deposited by the Big Sandy River and its tributaries covers about 4 percent of the survey area. This material was sorted as it was

deposited. Examples of this sorting are evident in areas of Nelse, Grigsby, and Allegheny soils. Nelse soils are dominantly loamy or sandy, have a thick, dark surface layer, and are along the banks of the Big Sandy River and its two main tributaries, the Tug and Levista Forks. Grigsby soils are dominantly sandy and are along the smaller tributaries. Allegheny soils are dominantly silty over sandy material and are along the higher terraces of the Big Sandy River and its two main tributaries.

Areas of mine spoil and fill material occur throughout the survey area. In areas that have been surface mined for coal, the overburden, or soil material and bedrock, is removed and then returned to the site after the coal has been extracted. Other highly disturbed areas have been created from earthmoving activities and are associated with urban development and highway construction.

Topography

Topography pertains to variations of the land surface. In Lawrence and Martin Counties, it is characterized primarily by long narrow ridgetops, steep mountainsides, and narrow valley bottoms.

Most soils are deeper at or near the base of the mountainsides because of the accumulation of colluvial material that has moved downslope from the upper slopes. Water also moves downslope laterally through the soil, carrying minerals in solution. These minerals contain plant nutrients, which can be absorbed by the soil or roots. Thus, the soils on the lower slopes generally have a slightly higher base saturation and a higher content of humus than the soils on the upper slopes. The additional moisture on the lower slopes also aids in plant growth.

On mountainsides or irregular land surfaces, the type of soil and the vegetation are partially determined by the aspect and slope. Orientation of the slope moderates or intensifies the effects of climate. Because of variations in the shading effect of the mountainous terrain, the amount of solar radiation that reaches the forest floor varies. On south- and west-facing slopes, organic material dries more quickly and thus decomposes at a faster rate. On north- and east-facing slopes, the soil remains cooler and moister for longer periods of time and more humus accumulates in the upper part of the soil profile. As a result, some soils on northeast-facing slopes, such as Cloverlick soils, have a exceptionally thick and dark A horizon. The most common tree species on these soils are sugar maple, yellow-poplar, buckeye, and basswood. In contrast, soils on southwest-facing slopes commonly have an A horizon that is only a few inches thick and is paler in color. On these drier soils, the most common tree species are red oak, chestnut oak, and black oak. Differences in the understory and the herbaceous layer on opposing slopes are also significant *(3)*.

Topography generally determines water movement and depth to the water table. On steep mountainsides water generally moves parallel to the surface because of a greater bulk density. The increased bulk density retards the downward movement of water by gravity. Water moves laterally down the mountain through a zone in the subsoil. In nearly level areas of Grigsby soils, water moves vertically through the profile. In slightly depressional areas, such as the landscapes on which Holly soils are located, water moves very slowly. These soils remain saturated during most of the period when plants are dormant. In seepy areas, such as the landscapes on which Holly and Orrville soils are located, water moves from the adjacent mountains across valley floors to stream channels. The excess water results in gleying or grayish mottles in the soils.

Climate

Climate affects the kind and number of plants and animals on and in the soils, the weathering of rocks and minerals, the susceptibility of the soils to erosion, and the rate of soil formation.

The climate of the survey area is temperate and humid. The average temperature is about 33 degrees F in winter and 72 degrees F in summer. Periods of extremely low or high temperatures are short. Temperature varies according to elevation, especially in spring. Hardwoods reach full canopy about 4 weeks later at the higher elevations than at the lower elevations. The average annual soil and air temperatures decrease about 1 degree per 550-foot increase in elevation.

The average annual precipitation is about 50 inches. Under average conditions, the monthly precipitation is fairly well distributed throughout the year and exceeds or nearly equals the potential evapotranspiration in all months, except for August and September *(6)*. On the average, tree growth is retarded for periods of a few days less than six times per growing season *(14)*.

The plentiful moisture supports a productive forest. As large amounts of organic matter are returned to the soil, soils develop a moderate or high content of humus in the surface layer.

The abundance of moisture leaches many of the soluble bases from the soils. The result is soils that typically have an acidic subsoil. Water also carries

clay minerals from the surface layer into the subsoil, and most soils have a higher content of clay in the subsoil than in the surface layer. Leaching and translocation are most pronounced in soils that are coarse textured and have a low organic matter content. Hazleton and Fedscreek soils on south- and west-facing aspects are examples of soils that have a high level of leaching and translocation. These soils have a low organic matter content, are coarse textured, and have a low content of basic cations in their exchange phases.

Living Organisms

Plants affect soil formation, mainly by adding organic matter to the soil. Animals, bacteria, microbes, and fungi contribute to soil formation by converting and incorporating the remains of plants into organic matter and plant nutrients. The organic matter imparts a dark color to the mineral soil material. The humus, or decomposed organic matter, aids in the formation of soil structure and also greatly increases the fertility of the soil.

Most of the soils in Lawrence and Martin Counties formed under hardwood forests. Soils that formed under this type of vegetation typically have a thin, dark surface layer and a brighter colored subsoil. Local differences in drainage, parent material, elevation, aspect, and other features contribute to forest density, composition of plant species, and kinds of associated ground cover. Variations in soils reflect these differences. For example, Cloverlick soils on cool aspects have a slightly darker and thicker surface layer than the comparable Hazleton soils on warm aspects. Because slopes with cool aspects receive less direct sunlight, they have a slightly lower soil temperature and have more favorable moisture conditions for vegetation than slopes with warm aspects. Soils on cool aspects produce more lush understory and canopy vegetation, and the decaying leaf litter results in the formation of a thicker and darker surface layer.

In forested areas, trees are blown down during periods of high winds and a large amount of soil is unearthed with the roots. These tree-tip mounds are common in the survey area. They alter the topography on a small scale. Although only a small area is affected by one tree, over a period of many years the surface layer becomes mixed with the underlying subsoil. The cumulation of this mixing can greatly affect soil formation *(5)*.

Vegetation in forested areas also affects the chemical make up of the soil by cycling nutrients from the subsoil to the surface layer. This is accompanied by the action of trees absorbing nutrients from the subsoil throughout the year and the return of nutrients to the surface layer, in the form of leaf litter, in the fall.

Many animals, such as earthworms, crawfish, centipedes, ants, and moles, inhabit the soil. Crawfish alter the soil by excavating large tunnels and bringing subsoil material to the surface. Holly soils commonly have many crawfish tunnels. Unless the water table is at the surface, the tunnels help to control runoff by allowing water to flow rapidly into the subsoil. Other animals that spend at least part of their life in the soil include many kinds of insects, mice, snakes, and groundhogs.

Humans have affected soil formation by clearing forests, draining wet areas, and plowing. They have mixed the soil layers, moved soil from place to place, added fertilizer and lime, and introduced new plant species. In places, as a result of accelerated erosion, most of the original surface layer has been removed and the less productive subsoil is exposed. From 1800 to about 1930, corn was grown on many of the mountain slopes *(8)*. Piles of rock that border the old fields and nearly pure stands of yellow-poplar are evidence of the early land use. In places, human activities have altered the soil so much that a different soil has formed. Some examples are disturbances resulting from coal-mining activities and the grading, shaping, and filling associated with road construction and urban development. Fiveblock, Fairpoint, and Kaymine soils formed in spoil material created from coal-mining activities. Udorthents formed in urban areas where the surface had been disturbed.

Time

The length of time that parent material has been in place and exposed to the active forces of soil formation greatly influences the nature of a given soil.

The geologic material of Lawrence and Martin Counties is entirely of Pennsylvanian age. As weathering processes act upon the exposed rocks, the residual material is subjected to the forces of water and gravity. Weathered soil material and rock fragments are carried downslope and deposited as colluvium.

Where the colluvial deposits are thick, the heavy weight of the colluvium, the steepness of slope, and water seeping along the bedrock tend to move the mass very slowly and irregularly downslope onto the flood plains. Thus, the valleys slowly become wider while the mountains become smaller.

Relatively young soils on ridgetops and side slopes

have developed soil structure and well defined colors in the B horizons. The accumulation of illuvial clay in the subsoil, however, is very small. Marrowbone and Fedscreek soils are examples of these young soils. They are classified as Typic Dystrochrepts.

Some soils on less sloping mountainsides have a thick, well defined B horizon that has a significant accumulation of illuvial clay. Examples are Shelocta and Vandalia soils. Soils in coves and on concave slopes with cool aspects have a thick, dark surface layer. An example is Cloverlick soils, which are classified as Umbric Dystrochrepts.

Fiveblock, Fairpoint, and Kaymine soils formed in human-deposited residue from coal mining and are essentially unaltered, heterogeneous, geologic material. The C horizon in these soils extends essentially from the surface downward and is subdivided on the basis of texture, percentage of rock fragments, and reaction. Some Fiveblock, Fairpoint, and Kaymine soils have an O or an A horizon, or both, and some may have an indistinct B horizon. The action of earthworms and plants is very evident in Fiveblock, Fairpoint, and Kaymine soils that have been in place for several years. These soils are classified as Typic Udorthents.

Soils in the valleys are divided into soils on stream bottoms and soils on stream terraces. Nelse soils are on stream bottoms and formed in recent alluvial deposits along streambanks. These soils, for the most part, are stratified and have little or no developed soil structure in the subsoil. Chagrin soils, which also formed in recent alluvial deposits on stream bottoms, only express stratification deep within the subsoil and show some evidence of structure in the upper part of the subsoil. Nelse soils are classified as Mollic Udifluvents. Chagrin soils are classified as Dystric Fluventic Eutrochrepts. The soils on terraces, such as Allegheny, also formed in alluvial material. These landscape positions, however, no longer receive significant amounts of deposition. As a result, the soils on terraces have been subjected to the factors of soil formation for longer periods of time than the soils on flood plains and have well developed subsoils. Allegheny soils are classified as Typic Hapludults.

Processes of Horizon Differentiation

Soil horizons form as parent material weathers. These horizons are layers distinguishable by such soil properties as color, structure, texture, and consistency. "Soil Taxonomy" identifies certain soil horizons or diagnostic features used in the classification system *(19)*. The major pedogenic processes and diagnostic features are described in this section.

Most soils have three major horizons—the A, B, and C horizons. They may also have an O or E horizon. Lowercase letters are used to indicate differences within the major horizons. The horizon designator Bt, for example, represents the part of the B horizon that has received an accumulation of clay from the overlying horizons. Shelocta and Vandalia soils have Bt horizons. Numbers are used after the lowercase letters to indicate vertical subdivisions within the horizon, such as Bt1 and Bt2.

Soils that formed under forest vegetation commonly have an O horizon at the surface. This horizon is an accumulation of organic material, such as leaves, needles, and twigs, or it is humified organic material that has not been significantly mixed with the mineral material.

The A horizon is a mineral horizon at or near the surface. It has been darkened by the incorporation of humified organic material. An E horizon may lie beneath the A horizon. Both the A and E horizons are characterized by maximum leaching and eluviation of clay, iron, and exchangeable bases. The E horizon, however, has not been darkened by the incorporation of organic material. It is generally the lightest colored horizon in the profile. A surface layer that has been disturbed is designated as an Ap horizon. When this situation exists, the E horizon is generally absent, because it has been incorporated into the Ap horizon.

The B horizon normally underlies the A or E horizon and is called the subsoil. It is characterized by the maximum accumulation or illuviation of clay, iron, aluminum, and other soluble compounds that have been leached from the surface and subsurface layers. In some soils, such as Rarden and Rayne, the B horizon formed mainly by alteration of the original parent material in place rather than by the illuviation of clay, iron, and aluminum. Iron released during the weathering of primary minerals forms iron oxides, which coat soil particles and result in brown or red colors, or both. The B horizon generally has more pronounced structure. It is generally finer in texture than the A and E horizons and is typically a brighter color than the A horizon or underlying C horizon.

The C horizon consists of materials that have only been slightly altered by the soil-forming processes, but it may be modified by weathering. Many young soils, such as those that formed in recent alluvium or human-deposited fills, do not have a B horizon. In these soils, the C horizon may be directly below an A horizon or at the surface.

The formation of a succession of soil horizons is

the result of one or more of the following processes: 1) accumulation of organic matter, 2) leaching of soluble constituents and exchangeable bases, 3) the biochemical reduction and subsequent transfer of iron, 4) the formation of soil structure, and 5) the formation and translocation of clay minerals. These processes often operate simultaneously and have probably been active for thousands of years in the older soils.

Organic matter accumulates as plant residue and other organic matter deposited on the surface decompose and are incorporated into the soil. These accumulations darken the mineral soil material and form the surface layer, or A horizon. Soils that formed under forest vegetation have received organic material mainly in the form of leaf litter on the surface. This material is not mixed deeply into the soil. Soils that formed under pasture-type vegetation, however, have accumulated organic matter deeper in the profile and thus have a thick, dark surface layer.

In Lawrence and Martin Counties, most of the soils on the ridgetops have well developed soil horizons as a result of weathering and of the processes of eluviation and illuviation. The leaching of exchangeable bases and other soluble constituents from the A horizon is necessary for the illuviation of clay into the subsoil. Clay minerals are removed from the A horizon as water percolates downward through the soil profile. The clay minerals are translocated in suspension to the lower horizons and are deposited as clay films on mineral grains, in pores, and on the faces of peds. Clay can also form in place in the B horizon by the interaction of dissolved silica and aluminum leached from the overlying horizons. These processes result in concentrations of sand- and silt-sized particles in the A and E horizons and in an increase in the content of clay in the B horizon.

The processes of eluviation and illuviation are not as noticeable in soils that form on flood plains because of the continuous addition of sediments during periods of stream overflow. These soils express few signs of soil development and are generally classified as Entisols or Inceptisols.

The reduction and transfer of iron occurs in soils that have poor natural drainage, such as Holly and Orrville soils. These soils are in bottomland positions and are periodically saturated with water. The wetness has resulted in gray colors that are speckled with brownish mottles. Gleying is the process that yields the gray colors. It is caused by a combination of wetness, microbial activity, and a low content of oxygen. The brownish mottles probably formed during the occasional periods when the soil was dry. Holly soils have a dark gray mottled subsoil as a result of gleying. These soils are saturated throughout the winter and spring and are occasionally dry during late summer.

References

(1) American Association of State Highway and Transportation Officials. 1986. Standard specifications for highway materials and methods of sampling and testing. 14th ed., 2 vols.

(2) American Society for Testing and Materials. 1993. Standard classification of soils for engineering purposes. ASTM Standard D 2487.

(3) Braun, E. Lucy. 1942. Forests of the Cumberland Mountains. Ecol. Monogr. 12:413-447.

(4) Clement, John. 1990. Kentucky facts: A comprehensive look at Kentucky today, county by county.

(5) Cremeans, D.W., and Paul Kalisz. 1988. Distribution and characteristics of windthrow microtopography on the Cumberland Plateau of Kentucky. Soil Sci. Soc. Am. J. 52:816-821.

(6) Illick, J.S., and J.E. Anghanbaugh. 1930. Pitch pine in Pennsylvania. Penn. Dep. Forests and Water Res. Bull. 2.

(7) Jenny, Hans. 1980. The soil resource. Ecol. Stud. 37.

(8) Kalisz, P.J. 1986. Soil properties of steep Appalachian old fields. Ecol. 67:1011-1023.

(9) Kentucky Agricultural Statistics Service. 1993. Kentucky agricultural statistics 1992-1993.

(10) Kentucky Coal Marketing and Export Council Cabinet for Economic Development and the Kentucky Coal Association. 1993. Pocket guide of Kentucky coal facts, 1993-1994.

(11) Kinsley, Neal P., and Douglas E. Powell. 1978. The forest resources of Kentucky. U.S. Dep. Agric., Forest Serv., Forest Res. Bull. NE-54.

(12) Krebs, Robert D., and Carl E. Zipper. 1989. Foundations for housing on reclaimed mined lands. Va. Coop. Ext. Serv. Publ. 460-115.

(13) Powell, Robert A. 1989. 120 Kentucky counties.

(14) Smalley, Glendon W. 1984. Classification and evaluation of forest sites in the Cumberland Mountains. U.S. Dep. Agric., Forest Serv. Gen. Tech. Rep. SO-50.

(15) Tackett, Regina. 1991. History of Lawrence County, Kentucky.

(16) United States Department of Agriculture. 1967. Soil survey laboratory data and descriptions for some soils of Kentucky. Soil Surv. Invest. Rep. 14.

(17) United States Department of Agriculture. 1984. Procedures for collecting soil samples and methods of analysis for soil survey. Soil Surv. Invest. Rep. 1.

(18) United States Department of Agriculture, Natural Resources Conservation Service. 1998. Keys to soil taxonomy. 8th ed. Soil Surv. Staff.

(19) United States Department of Agriculture, Natural Resources Conservation Service. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd ed. Soil Surv. Staff, U.S. Dep. Agric. Handb. 436.

(20) United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210.

(21) United Stated Department of Agriculture, Soil Conservation Service. 1965. Reconnaissance soil survey of fourteen counties in eastern Kentucky.

(22) United States Department of Agriculture, Soil Conservation Service. 1993. Soil survey manual. Soil Surv. Staff, U.S. Dep. Agric. Handb. 18.

(23) United States Department of Commerce. 1983. Land and water areas—Kentucky counties.

(24) United States Department of Commerce, Bureau of the Census. 1992. Census of agriculture.

(25) United States Department of Commerce, Bureau of the Census. 1992. General population characteristics of Kentucky. *In* 1990 Census of Population.

(26) United States Department of the Interior, Geologic Survey. 1962. Geologic map of the Kermit Quadrangle, Martin County, Kentucky. Map GQ-178.

(27) United States Department of the Interior, Geologic Survey. 1962. Geologic map of the Williamson Quadrangle, Martin and Pike Counties, Kentucky. Map GQ-187.

(28) United States Department of the Interior, Geologic Survey. 1962. Geologic map of the Varney Quadrangle, Martin and Pike Counties, Kentucky. Map GQ-180.

(29) United States Department of the Interior, Geologic Survey. 1963. Geologic map of the Inez Quadrangle, Martin and Johnson Counties, Kentucky. Map GQ-226.

(30) United States Department of the Interior, Geologic Survey. 1963. Geologic map of the Thomas Quadrangle, Martin, Floyd, and Pike Counties, Kentucky. Map GQ-227.

(31) United States Department of the Interior, Geologic Survey. 1964. Geologic map of the Boltsfork and Burnaugh Quadrangles, Lawrence and Boyd Counties, Kentucky. Map GQ-316.

(32) United States Department of the Interior, Geologic Survey. 1964. Geologic map of the Lancer Quadrangle, Martin, Floyd, and Johnson Counties, Kentucky. Map GQ-347.

(33) United States Department of the Interior, Geologic Survey. 1964. Geologic map of the Offutt Quadrangle, Martin and Johnson Counties, Kentucky. Map GQ-348.

(34) United States Department of the Interior, Geologic Survey. 1966. Geologic map of the Isonville Quadrangle, Lawrence, Elliott, and Morgan Counties, Kentucky. Map GQ-501.

(35) United States Department of the Interior, Geologic Survey. 1966. Geologic map of the Milo and Webb Quadrangles, Lawrence and Martin Counties, Kentucky. Map GQ-543.

(36) United States Department of the Interior, Geologic Survey. 1967. Geologic map of the Fallsburg and Prichard Quadrangles, Lawrence and Boyd Counties, Kentucky. Map GQ-584.

(37) United States Department of the Interior, Geologic Survey. 1968. Geologic map of the Redbush Quadrangle, Lawrence, Morgan, and Johnson Counties, Kentucky. Map GQ-708.

(38) United States Department of the Interior, Geologic Survey. 1971. Geologic map of the Naugatuck Quadrangle, Martin County, Kentucky. Map GQ-879.

(39) United States Department of the Interior, Geologic Survey. 1971. Geologic map of the Webbville Quadrangle, Lawrence, Carter, and Boyd Counties, Kentucky. Map GQ-927.

(40) United States Department of the Interior, Geologic Survey. 1977. Geologic map of the Mazie Quadrangle, Lawrence and Elliott Counties, Kentucky. Map GQ-1388.

(41) United States Department of the Interior, Geologic Survey. 1977. Geologic map of the Sitka Quadrangle, Lawrence and Johnson Counties, Kentucky. Map GQ-1398.

(42) United States Department of the Interior, Geologic Survey. 1977. Geologic map of the Willard Quadrangle, Lawrence, Elliott, and Carter Counties, Kentucky. Map GQ-1387.

(43) United States Department of the Interior, Geologic Survey. 1978. Geologic map of the Adams Quadrangle, Lawrence County, Kentucky. Map GQ-1489.

(44) United States Department of the Interior, Geologic Survey. 1978. Geologic map of the Blaine Quadrangle, Lawrence County, Kentucky. Map GQ-1507.

(45) United States Department of the Interior, Geologic Survey. 1978. Geologic map of the Dingus Quadrangle, Lawrence, Elliott, Magoffin, and Morgan Counties, Kentucky. Map GQ-1463.

(46) United States Department of the Interior, Geologic Survey. 1978. Geologic map of the Louisa Quadrangle, Lawrence County, Kentucky. Map GQ-1462.

(47) United States Department of the Interior, Geologic Survey. 1978. Geologic map of the Richardson Quadrangle, Lawrence and Johnson Counties, Kentucky. Map GQ-1460.

(48) William, G.P., and G.P. Guy. 1973. Erosional and depositional aspects of Hurricane Camille in Virginia. U.S. Geol. Surv. Prof. Pap. 804.

Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. A body of alluvium, with or without flow deposits, that has a surface that forms a segment of a cone radiating downslope from the point where a stream emerges from a narrow valley onto a less sloping surface.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Aspect. The direction in which a slope faces with respect to the compass or to the rays of the sun. On a warm aspect, slopes of more than 15 percent face an azimuth of 135 to 315 degrees. On a cool aspect, slopes of more than 15 percent face an azimuth of 315 to 135 degrees.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench (landform). A relatively flat to gently inclined erosional surface that developed on resistant bedrock and that is bounded on one side by a steeper ascending slope and on the other side by a steeper descending slope.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvial fan. A fan-shaped mass of soil and rock deposited at the base of a hill or at the point where a stream enters a valley. The material is deposited mainly by the action of gravity.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dendritic drainage pattern. A drainage pattern in which the streams branch randomly in all directions and at almost any angle. It resembles the branching of certain trees.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Differential settling. The settlement of fill material that is created from surface mining, road construction, or urban development and that varies with respect to time and position.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and

resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fill material. A mixture of soil and bedrock materials created from disturbances such as surface mining, road construction, and urban development.

Fine earth. The portion of the soil finer than a No. 10 (2 millimeter) U.S. standard sieve.

Fine textured soil. Sandy clay, silty clay, or clay.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Formation. A body of rock generally characterized by some degree of internal lithologic homogeneity or distinctive lithologic features and by prevailing shape. It is mappable at the earth's surface or traceable in the subsurface.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Highwall. A vertical wall of bedrock exposed during surface mining.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected

by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Interbedded. Rock material was laid down in sequence between beds alternating with others of different character.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Leader. A pipe for conducting liquid.

Limestone. A sedimentary rock consisting chiefly of calcium carbonate, primarily in the form of calcite.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outslope. A steeply sloping area below a mining bench or development site that is made of fill material.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1

square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Poorly graded. Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoxmorphic concentrations. Bodies of apparent accumulations of iron and manganese oxides.

Redoximorphic depletions. Zones of low chroma where either iron or manganese oxides or iron and manganese oxides and clay have been stripped away.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The relative difference in elevation between the ridge and the valleys of a given area.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Ridge. A long narrow elevation of the land surface that is typically sharp crested with steep sides and forms an extended upland between valleys.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment

mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments ranging from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. The slope bounding a drainageway and lying between the drainageway and the adjacent ridge.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 6 percent
Strongly sloping	6 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 60 percent
Very steep	more than 60 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil depth. The distance from the top of the soil to

the underlying bedrock. The distance, in inches, is expressed as:

Shallow	0 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 inches

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stream bottom. The normal flood plain of a stream, subject to flooding.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. A stream terrace that originally formed near the level of the stream and represents the dissected remnants of an abandoned flood plain, streambed, or valley floor produced during a former state of erosion or deposition.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsidence. The action of sinking.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topography. The relative positions and elevations of the natural or manmade features of an area that describe the configuration of its surface.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes

produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse-grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

Table 1A.—Temperature and Precipitation for Lawrence County

(Recorded in the period 1965-86 at Tomahawk and Louisa, Kentucky)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	Maximum temp. higher than--	Minimum temp. lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snow-fall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January--	42.0	18.2	30.1	71	-11	44	2.89	1.63	4.01	6	6.2
February-	45.6	18.1	31.8	76	-8	49	3.01	1.57	4.28	6	5.8
March----	58.3	28.2	43.3	84	3	176	3.50	2.09	4.76	7	1.8
April----	69.0	37.8	53.4	89	20	393	3.53	2.16	4.77	7	0.2
May------	76.8	45.9	61.3	91	27	646	4.33	2.61	5.87	9	0.0
June-----	83.2	55.2	69.2	94	38	859	3.66	1.95	5.15	7	0.0
July-----	86.3	60.0	73.1	96	46	1,013	4.87	3.39	6.24	8	0.0
August---	85.4	59.5	72.5	95	45	987	3.88	2.43	5.19	6	0.0
September	79.3	51.8	65.6	94	34	754	3.20	1.70	4.52	5	0.0
October--	68.6	38.5	53.6	86	20	409	2.85	1.61	4.14	5	0.0
November-	57.5	29.7	43.6	81	11	171	3.37	1.96	4.63	7	0.5
December-	47.7	22.9	35.3	75	-1	79	3.34	1.68	4.78	6	2.3
Yearly:											
Average	66.6	38.8	52.7	---	---	---	---	---	---	---	---
Extreme	102	-18	---	97	-14	---	---	---	---	---	---
Total--	---	---	---	---	---	5,579	42.44	37.12	47.57	79	16.7

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 1B.–Temperature and Precipitation for Martin County

(Recorded in the period 1965-86 at Tomahawk, Kentucky)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	Maximum temp. higher than--	Minimum temp. lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January--	42.0	18.2	30.1	71	-11	44	3.20	1.59	4.60	8	7.8
February-	45.6	18.1	31.8	76	-8	49	3.04	1.66	4.26	8	7.9
March----	58.3	28.2	43.3	84	3	176	4.16	2.70	5.48	10	3.2
April----	69.0	37.8	53.4	89	20	393	4.15	2.45	5.68	9	0.1
May------	76.8	45.9	61.3	91	27	646	4.84	2.66	6.76	9	0.0
June-----	83.2	55.2	69.2	94	38	859	4.19	2.45	5.74	7	0.0
July-----	86.3	60.0	73.1	96	46	1,013	5.66	4.05	7.16	9	0.0
August---	85.4	59.5	72.5	95	45	987	4.31	2.46	5.95	7	0.0
September	79.3	51.8	65.6	94	34	754	3.44	1.77	4.91	6	0.0
October--	68.6	38.5	53.6	86	20	409	3.13	1.99	4.17	6	0.0
November-	57.5	29.7	43.6	81	11	171	3.82	2.21	5.26	7	0.8
December-	47.7	22.9	35.3	75	-1	79	3.89	2.06	5.49	7	3.0
Yearly:											
Average	66.6	38.8	52.7	---	---	---	---	---	---	---	---
Extreme	102	-18	---	97	-14	---	---	---	---	---	---
Total--	---	---	---	---	---	5,579	47.85	38.13	52.03	93	22.8

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.—Freeze Dates in Spring and Fall

(Recorded in the period 1965-86 at Tomahawk, Kentucky)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 16	May 13	May 18
2 years in 10 later than--	Apr. 11	May 7	May 14
5 years in 10 later than--	Apr. 4	Apr. 27	May 7
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 15	Oct. 3	Sept. 22
2 years in 10 earlier than--	Oct. 21	Oct. 8	Sept. 27
5 years in 10 earlier than-	Oct. 31	Oct. 16	Oct. 6

Table 3.—Growing Season

(Recorded in the period 1965-86 at Tomahawk, Kentucky)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	192	151	135
8 years in 10	198	158	141
5 years in 10	210	172	152
2 years in 10	222	186	163
1 year in 10	228	193	169

Table 4.—Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Lawrence County	Martin County	Total	
				Area	Extent
		Acres	Acres	Acres	Pct
AaB	Allegheny loam, 2 to 6 percent slopes	30	0	30	*
AaC	Allegheny loam, 6 to 15 percent slopes	66	0	66	*
AbB	Allegheny loam, 2 to 6 percent slopes, rarely flooded	1,119	48	1,167	0.3
AbC	Allegheny loam, 6 to 15 percent slopes, rarely flooded	513	15	528	0.1
AeB	Allegheny loam, 2 to 6 percent slopes, occasionally flooded	428	46	474	0.1
BlC	Blairton-Cruze-Marrowbone complex, 6 to 12 percent slopes	719	0	719	0.2
BlD	Blairton-Cruze-Marrowbone complex, 12 to 25 percent slopes	18,164	0	18,164	4.4
Ch	Chagrin loam, frequently flooded	376	0	376	0.1
ClF	Cloverlick-Hazleton-Shelocta complex, 30 to 80 percent slopes, very stony	15,691	41,481	57,172	13.7
		15,691	41,481	57,172	13.7
CmB	Cotaco silt loam, 0 to 4 percent slopes	59	0	59	*
CmC	Cotaco silt loam, 4 to 12 percent slopes	111	0	111	*
CoB	Cotaco silt loam, 0 to 4 percent slopes, rarely flooded	178	3	181	*
CoC	Cotaco silt loam, 4 to 12 percent slopes, rarely flooded	665	46	711	0.2
CtB	Cotaco silt loam, 0 to 4 percent slopes, occasionally flooded	460	0	460	0.1
DAM	Dams, large	15	0	15	*
Dm	Dumps, mine; tailings; and tipples	356	571	927	0.2
FiB	Fiveblock, Fairpoint, and Kaymine soils, 0 to 6 percent slopes, stony	1,276	2,659	3,935	0.9
FiD	Fiveblock, Fairpoint, and Kaymine soils, 6 to 30 percent slopes, stony	3,653	5,807	9,460	2.3
FiF	Fiveblock, Fairpoint, and Kaymine soils, 30 to 80 percent slopes, stony	7,939	20,480	28,419	6.8
Gr	Grigsby fine sandy loam, frequently flooded	2,899	485	3,384	0.8
HaC	Hayter-Grigsby complex, 2 to 15 percent slopes	2,757	0	2,757	0.7
HnF	Hazelton-Shelocta-Fedscreek complex, 30 to 80 percent slopes, very stony	14,158	33,152	47,310	11.4
Ho	Holly silt loam, frequently flooded	374	0	374	0.1
MaF	Marrowbone-Blairton-Dekalb complex, 25 to 60 percent slopes, rocky	23,908	0	23,908	5.7
NeD	Nelse fine sandy loam, 4 to 25 percent slopes, frequently flooded	2,187	531	2,718	0.7
Or	Orrville silt loam, frequently flooded	815	72	887	0.2
RaF	Rayne-Marrowbone-Dekalb complex, 20 to 80 percent slopes, very rocky	16,404	35,671	52,075	12.5
RoF	Rigley-Rock outcrop complex, 30 to 70 percent slopes	588	0	588	0.1
SeE	Shelocta silt loam, 12 to 30 percent slopes	2,539	0	2,539	0.6
SgC	Shelocta-Grigsby-Orrville complex, 2 to 15 percent slopes	10,009	608	10,617	2.6
ShF	Shelocta-Hazleton-Fedscreek complex, 30 to 60 percent slopes, stony	73,499	0	73,499	17.7
UdC	Udorthents-Urban land complex, 0 to 12 percent slopes	5,271	4,735	10,006	2.4
UdF	Udorthents-Urban land complex, 0 to 80 percent slopes, benched	1,728	1,005	2,733	0.7
UpC	Upshur-Rarden complex, 6 to 12 percent slopes	1,650	0	1,650	0.4
UpD	Upshur-Rarden complex, 12 to 25 percent slopes	21,148	0	21,148	5.1
UpF	Upshur-Rarden complex, 25 to 60 percent slopes, rocky	14,275	0	14,275	3.4
VaF	Vandalia-Beech complex, 20 to 60 percent slopes, stony	6,169	0	6,169	1.5
VaF2	Vandalia-Beech complex, 20 to 60 percent slopes, stony, eroded	13,691	0	13,691	3.3
W	Water	2,919	86	3,005	0.7
	Total	268,806	147,501	416,307	100.0

* Less than 0.1 percent.

Table 5.—Land Capability and Non-Irrigated Yields by Map Unit

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. AUM means animal unit month, which is the amount of forage or feed required to feed one animal unit—one cow, one horse, one mule, five sheep, or five goats—for 30 days)

Map symbol and soil name	Land capability	Alfalfa hay	Corn	Grass-legume hay	Pasture	Tobacco
		Tons	Bu	Tons	AUM	Lbs
AaB Allegheny	IIe	5.00	150.00	4.00	7.00	3,000.00
AaC: Allegheny	IIIe	4.50	110.00	3.00	6.00	2,400.00
AbB: Allegheny	IIe	5.00	150.00	4.00	7.00	3,000.00
AbC: Allegheny	IIIe	4.50	110.00	3.00	6.00	2,400.00
AeB: Allegheny	IIe	5.00	140.00	3.50	6.50	2,700.00
BlC: Blairton Cruze Marrowbone	IIIe IIIe IIIe	---	80.00	3.50	6.00	2,500.00
BlD: Blairton Cruze Marrowbone	IVe IVe IVe	---	70.00	3.00	5.50	---
Ch: Chagrin	IIw	---	90.00	3.00	6.00	---
ClF: Cloverlick Hazleton Shelocta	VIIe VIIe VIIe	---	---	---	---	---
CmB: Cotaco	IIw	---	120.00	3.00	6.00	2,400.00
CmC: Cotaco	IIIe	---	95.00	2.50	5.00	2,200.00
CoB: Cotaco	IIw	---	90.00	2.00	4.50	2,000.00
CoC: Cotaco	IIIe	---	95.00	2.50	5.00	2,200.00
CtB: Cotaco	IIw	---	90.00	2.00	4.50	2,000.00
DAM. Dams, large						

Table 5.—Land Capability and Non-Irrigated Yields by Map Unit—Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn	Grass-legume hay	Pasture	Tobacco
		Tons	Bu	Tons	AUM	Lbs
Dm.						
Dumps, mine; tailings; and tipples						
FiB, FiD:		---	---	---	---	---
Fiveblock	VIs					
Fairpoint	VIs					
Kaymine	VIs					
FiF:		---	---	---	---	---
Fiveblock	VIIe					
Fairpoint	VIIe					
Kaymine	VIIe					
Gr:						
Grigsby	IIw	---	85.00	3.00	6.00	---
HaC:		---	120.00	3.00	6.00	2,400.00
Hayter	IIIe					
Grigsby	IIw					
HnF:		---	---	---	---	---
Hazleton	VIIe					
Shelocta	VIIe					
Fedscreek	VIIe					
Ho:						
Holly	IIIw	---	70.00	2.00	4.00	---
MaF:		---	---	---	---	---
Marrowbone	VIIe					
Blairton	VIIe					
Dekalb	VIIe					
NeD:						
Nelse	IVe	---	---	---	5.00	---
Or:						
Orrville	IIw	---	85.00	3.00	6.00	---
RaF:		---	---	---	---	---
Rayne	VIIe					
Marrowbone	VIIe					
Dekalb	VIIe					
RoF:		---	---	---	---	---
Rigley	VIIe					
Rock outcrop	VIIIs					
SeE:						
Shelocta	VIe	---	100.00	3.00	6.00	---
SgC:		---	120.00	3.00	6.00	2,400.00
Shelocta	IIIe					
Grigsby	IIw					
Orrville	IIw					

Table 5.—Land Capability and Non-Irrigated Yields by Map Unit—Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn	Grass-legume hay	Pasture	Tobacco
		Tons	Bu	Tons	AUM	Lbs
ShF:		---	---	---	---	---
Shelocta	VIIe					
Hazleton	VIIe					
Fedscreek	VIIe					
UdC, UdF.						
Udorthents-Urban land						
UpC:		---	90.00	3.50	6.00	---
Upshur	IVe					
Rarden	IVe					
UpD:		---	75.00	3.00	5.50	---
Upshur	VIe					
Rarden	VIe					
UpF:		---	---	---	---	---
Upshur	VIIe					
Rarden	VIIe					
VaF, VaF2:		---	---	---	---	---
Vandalia	VIIe					
Beech	VIIe					
W.						
Water						

Table 6.—Prime Farmland

Map symbol	Map unit name
AaB	Allegheny loam, 2 to 6 percent slopes
AbB	Allegheny loam, 2 to 6 percent slopes, rarely flooded
AeB	Allegheny loam, 2 to 6 percent slopes, occasionally flooded
Ch	Chagrin loam, frequently flooded (where protected from flooding or not flooded during the growing season)
CmB	Cotaco silt loam, 0 to 4 percent slopes
CoB	Cotaco loam, 0 to 4 percent slopes, rarely flooded
CtB	Cotaco silt loam, 0 to 4 percent slopes, occasionally flooded
Gr	Grigsby fine sandy loam, frequently flooded (where protected from flooding or not flooded during the growing season)
Ho	Holly silt loam, frequently flooded (where protected from flooding and drained)
Or	Orville silt loam, frequently flooded (where protected from flooding or not flooded during the growing season)

Table 7.—Forest Productivity

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			cu ft/ac	
AaB:				
Allegheny	American elm	---	---	black walnut,
	black oak	78	57	eastern white
	northern red oak	---	---	pine, northern red
	shortleaf pine	80	129	oak, shortleaf
	sugar maple	---	---	pine, white ash,
	Virginia pine	72	114	white oak, yellow-
	white ash	---	---	poplar
	yellow-poplar	93	100	
AaC, AbB, AbC, AeB:				
Allegheny	American elm	---	---	black walnut,
	black oak	78	57	eastern white
	northern red oak	---	---	pine, northern red
	red maple	---	---	oak, shortleaf
	shortleaf pine	80	129	pine, white ash,
	sugar maple	---	---	white oak, yellow-
	Virginia pine	72	114	poplar
	white ash	---	---	
	yellow-poplar	93	100	
BlC:				
Blairton	northern red oak	70	57	eastern white pine,
	sugar maple	70	43	Norway spruce,
	white ash	70	29	white oak, yellow-
	yellow-poplar	80	72	poplar
Cruze	black cherry	---	---	eastern white pine,
	northern red oak	80	57	northern red oak,
	sugar maple	---	---	white oak, yellow-
	white oak	---	---	poplar
	yellow-poplar	---	---	
Marrowbone	black oak	---	---	shortleaf pine,
	hickory	---	---	white oak
	red maple	---	---	
	shortleaf pine	75	114	
	Virginia pine	---	---	
	white oak	---	---	
BlD:				
Blairton	northern red oak	70	57	eastern white pine,
	sugar maple	70	43	Japanese larch,
	white ash	70	29	Norway spruce,
	yellow-poplar	80	72	yellow-poplar
Cruze	black cherry	---	---	eastern white pine,
	northern red oak	80	57	northern red oak,
	sugar maple	---	---	white oak, yellow-
	white oak	---	---	poplar
	yellow-poplar	---	---	
Marrowbone	black oak	---	---	shortleaf pine,
	hickory	---	---	white oak
	red maple	---	---	
	shortleaf pine	75	114	
	Virginia pine	---	---	
	white oak	---	---	

Table 7.—Forest Productivity—Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			cu ft/ac	
Ch:				
Chagrin	northern red oak	75	57	black walnut, eastern white pine, northern red oak, white ash, white oak, yellow-poplar
	sugar maple	---	---	
	white oak	---	---	
ClF:				
Cloverlick	northern red oak	75	57	eastern white pine, shortleaf pine, white oak
	sugar maple	---	---	
Hazleton	northern red oak	70	57	Austrian pine, black cherry, eastern white pine, Japanese larch, Norway spruce
	yellow-poplar	80	72	
Shelocta	American beech	---	---	eastern white pine, shortleaf pine, white oak
	black oak	73	57	
	blackgum	---	---	
	red maple	55	---	
	scarlet oak	70	57	
	white oak	65	43	
	yellow-poplar	90	86	
CmB, CmC, CoB, CoC, CtB:				
Cotaco	black oak	87	72	eastern white pine, sweetgum, white oak, yellow-poplar
	Virginia pine	81	129	
	white oak	---	---	
	yellow-poplar	95	100	
DAM.				
Dams, large				
Dm.				
Dumps, mine; tailings; and tipples				
FiB, FiD, FiF:				
Fiveblock	American sycamore	90	100	black locust, eastern white pine, red maple, Virginia pine, yellow-poplar
	black locust	---	---	
	eastern white pine	94	172	
	northern red oak	80	57	
	yellow-poplar	105	114	
Fairpoint	black locust	---	---	black locust, eastern white pine, shortleaf pine, white oak
	loblolly pine	82	114	
	sweetgum	---	---	
Kaymine	American sycamore	90	100	black locust, eastern white pine, red maple, Virginia pine, yellow-poplar
	black locust	---	---	
	eastern white pine	94	172	
	northern red oak	80	57	
	yellow-poplar	105	114	

Table 7.—Forest Productivity—Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			cu ft/ac	
Gr:				
Grigsby	American sycamore	---	---	black walnut, eastern white pine, northern red oak, white oak, yellow-poplar
	black walnut	---	---	
	hickory	---	---	
	northern red oak	85	57	
	red maple	---	---	
	sweetgum	---	---	
	white oak	85	57	
HaC:				
Hayter	hickory	---	---	black walnut, eastern white pine, northern red oak, white oak, yellow-poplar
	northern red oak	86	57	
	white oak	---	---	
	yellow-poplar	96	100	
Grigsby	American sycamore	---	---	black walnut, eastern white pine, northern red oak, white oak, yellow-poplar
	black walnut	---	---	
	hickory	---	---	
	northern red oak	85	57	
	red maple	---	---	
	sweetgum	---	---	
	white oak	85	57	
HnF:				
Hazleton	black oak	60	43	Austrian pine, black cherry, eastern white pine, Norway spruce, yellow-poplar
	northern red oak	60	43	
	yellow-poplar	---	---	
Shelocta	American beech	---	---	black oak, black walnut, eastern white pine, shortleaf pine, white ash, white oak, yellow-poplar
	black oak	79	57	
	black walnut	---	---	
	blackgum	---	---	
	hickory	---	---	
	northern red oak	---	---	
	shortleaf pine	77	129	
	white oak	79	57	
	yellow-poplar	102	100	
Fedscreek	American beech	---	---	eastern white pine, shortleaf pine, white oak
	black oak	66	43	
	hickory	---	---	
	red maple	---	---	
	scarlet oak	65	43	
	white oak	62	43	
Ho:				
Holly	black cherry	---	---	American sycamore, baldcypress, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum
	eastern cottonwood	---	---	
	green ash	---	---	
	pin oak	90	72	
	red maple	---	---	
	swamp white oak	---	---	

Table 7.—Forest Productivity—Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			cu ft/ac	
MaF:				
Marrowbone	black oak	---	---	shortleaf pine, white oak
	hickory	---	---	
	red maple	---	---	
	shortleaf pine	75	114	
	Virginia pine	---	---	
	white oak	---	---	
Blairton	northern red oak	70	57	eastern white pine, Norway spruce, white oak, yellow-poplar
	sugar maple	70	43	
	white ash	70	29	
	yellow-poplar	80	72	
Dekalb	American beech	---	---	eastern white pine, shortleaf pine, white oak
	hickory	---	---	
	scarlet oak	---	---	
	white oak	70	57	
NeD:				
Nelse	American sycamore	---	---	American sycamore, green ash
	black willow	---	---	
	boxelder	---	---	
	green ash	---	---	
	river birch	---	---	
	silver maple	---	---	
Or:				
Orrville	black cherry	---	---	eastern white pine, green ash, northern red oak, Norway spruce, red pine, white ash, white oak, white spruce, yellow-poplar
	northern red oak	80	57	
	pin oak	85	72	
	sugar maple	80	57	
	white ash	---	---	
	white oak	---	---	
	yellow-poplar	90	86	
RaF:				
Rayne	northern red oak	80	57	eastern white pine, northern red oak, yellow-poplar
	shortleaf pine	75	114	
	yellow-poplar	90	86	
Marrowbone	American beech	---	---	eastern white pine, northern red oak, shortleaf pine, white oak, yellow-poplar
	northern red oak	---	---	
	sweet birch	---	---	
	yellow-poplar	95	100	
Dekalb	northern red oak	52	29	eastern white pine, Norway spruce, Virginia pine

Table 7.–Forest Productivity–Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			cu ft/ac	
RoF:				
Rigley	American beech	---	---	eastern white pine,
	black oak	78	57	northern red oak,
	hickory	---	---	shortleaf pine,
	northern red oak	---	---	white oak, yellow-
	shortleaf pine	80	129	poplar
	white oak	75	57	
	yellow-poplar	94	100	
Rock outcrop.				
SeE:				
Shelocta	American beech	---	---	black oak, black
	black oak	79	57	walnut, eastern
	black walnut	---	---	white pine,
	cucumbertree	---	---	northern red oak,
	northern red oak	---	---	shortleaf pine,
	shortleaf pine	77	129	white ash, white
	white oak	77	57	oak, yellow-poplar
	yellow-poplar	99	100	
SgC:				
Shelocta	American beech	---	---	black oak, black
	black oak	79	57	walnut, eastern
	black walnut	---	---	white pine,
	cucumbertree	---	---	northern red oak,
	northern red oak	---	---	shortleaf pine,
	shortleaf pine	77	129	white ash, white
	white oak	77	57	oak, yellow-poplar
	yellow-poplar	99	100	
Grigsby	American sycamore	---	---	black walnut,
	black walnut	---	---	eastern white
	hickory	---	---	pine, northern red
	northern red oak	85	57	oak, shortleaf
	red maple	---	---	pine, white ash,
	sweetgum	---	---	white oak, yellow-
	white oak	85	57	poplar
	yellow-poplar	110	129	
Orrville	black cherry	---	---	eastern white pine,
	northern red oak	80	57	green ash,
	pin oak	85	72	northern red oak,
	sugar maple	80	57	Norway spruce, red
	white ash	---	---	pine, white ash,
	white oak	---	---	white oak, yellow-
	yellow-poplar	90	86	poplar
ShF:				
Shelocta	American beech	---	---	eastern white pine,
	black oak	73	57	shortleaf pine,
	blackgum	---	---	white oak
	red maple	55	---	
	scarlet oak	70	57	
	white oak	65	43	
	yellow-poplar	90	86	

Table 7.—Forest Productivity—Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			cu ft/ac	
ShF:				
Hazleton	northern red oak	70	57	Austrian pine, black cherry, eastern white pine, Japanese larch, Norway spruce
	yellow-poplar	80	72	
Fedscreek	American beech	---	---	eastern white pine, shortleaf pine, white oak
	black oak	66	43	
	hickory	---	---	
	red maple	---	---	
	scarlet oak	65	43	
	white oak	62	43	
UdC, UdF.				
Udorthents-Urban land				
UpC, UpD, UpF:				
Upshur	black oak	61	43	black oak, Virginia pine
	chestnut oak	---	---	
	hickory	---	---	
	Virginia pine	58	86	
	white oak	58	43	
Rarden	black oak	80	57	eastern white pine, northern red oak, red maple, shortleaf pine, white oak
	red maple	---	---	
	scarlet oak	---	---	
	Virginia pine	68	100	
	white oak	75	57	
VaF, VaF2:				
Vandalia	northern red oak	77	57	eastern white pine, northern red oak, shortleaf pine, white oak, yellow-poplar
	Virginia pine	80	114	
	yellow-poplar	90	86	
Beech	northern red oak	---	---	eastern white pine, northern red oak, shortleaf pine, white oak, yellow-poplar
	Virginia pine	---	---	
	yellow-poplar	---	---	
W.				
Water				

Table 8.—Forest Management, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Limitations affecting construction of haul roads and log landings	Suitability for log landings	Soil rutting hazard
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
AaB:			
Allegheny	Moderate Low strength	Moderately suited Low strength	Severe Low strength
AaC:			
Allegheny	Moderate Low strength	Moderately suited Slope Low strength	Severe Low strength
AbB:			
Allegheny	Moderate Low strength	Moderately suited Low strength	Severe Low strength
AbC:			
Allegheny	Moderate Low strength	Moderately suited Slope Low strength	Severe Low strength
AeB:			
Allegheny	Severe Flooding Low strength	Poorly suited Flooding Low strength	Severe Low strength
BlC:			
Blairton	Slight	Moderately suited Slope Low strength Wetness	Severe Low strength
Cruze	Moderate Low strength	Moderately suited Slope Low strength	Severe Low strength
Marrowbone	Moderate Restrictive layer	Moderately suited Slope	Moderate Low strength
BlD:			
Blairton	Severe Landslides Slope	Poorly suited Landslides Slope Low strength Wetness	Severe Low strength
Cruze	Severe Landslides Slope Low strength	Poorly suited Landslides Slope Low strength	Severe Low strength
Marrowbone	Moderate Restrictive layer Landslides Slope	Poorly suited Slope Landslides	Moderate Low strength

Table 8.—Forest Management, Part I—Continued

Map symbol and soil name	Limitations affecting construction of haul roads and log landings	Suitability for log landings	Soil rutting hazard
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
Ch:			
Chagrin	Severe Flooding Low strength	Poorly suited Flooding Low strength	Severe Low strength
ClF:			
Cloverlick	Severe Landslides Slope	Poorly suited Slope Landslides Low strength	Moderate Low strength
Hazleton	Severe Landslides Slope	Poorly suited Slope Landslides	Slight Strength
Shelocta	Severe Landslides Slope Low strength	Poorly suited Slope Landslides Low strength	Severe Low strength
CmB:			
Cotaco	Moderate Low strength	Moderately suited Low strength	Severe Low strength
CmC:			
Cotaco	Moderate Low strength	Moderately suited Low strength Slope	Severe Low strength
CoB:			
Cotaco	Moderate Low strength	Moderately suited Low strength	Severe Low strength
CoC:			
Cotaco	Moderate Low strength	Moderately suited Low strength Slope	Severe Low strength
CtB:			
Cotaco	Severe Flooding Low strength	Poorly suited Flooding Low strength	Severe Low strength
DAM:			
Dams, large	Not rated	Not rated	Not rated
Dm:			
Dumps, mine; tailings, and tipples	Not rated	Not rated	Not rated
FiB:			
Fiveblock	Moderate Sandiness	Well suited	Moderate Low strength
Fairpoint	Moderate Low strength	Moderately suited Low strength	Severe Low strength
Kaymine	Slight	Well suited	Slight

Table 8.—Forest Management, Part I—Continued

Map symbol and soil name	Limitations affecting construction of haul roads and log landings	Suitability for log landings	Soil rutting hazard
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
FiD:			
Fiveblock	Severe Landslides Slope Sandiness	Poorly suited Landslides Slope	Moderate Low strength
Fairpoint	Severe Landslides Slope	Poorly suited Landslides Slope Low strength	Severe Low strength
Kaymine	Severe Landslides Slope	Poorly suited Landslides Slope	Slight
FiF:			
Fiveblock	Severe Landslides Slope	Poorly suited Slope Landslides	Moderate Low strength
Fairpoint	Severe Landslides Slope	Poorly suited Slope Landslides Low strength	Severe Low strength
Kaymine	Severe Landslides Slope	Poorly suited Slope Landslides	Slight
Gr:			
Grigsby	Severe Flooding	Poorly suited Flooding	Moderate Low strength
HaC:			
Hayter	Moderate Low strength Landslides	Moderately suited Slope Low strength Landslides	Severe Low strength
Grigsby	Severe Flooding	Poorly suited Flooding	Moderate Low strength
HnF:			
Hazleton	Severe Landslides Slope	Poorly suited Slope Landslides	Slight
Shelocta	Severe Landslides Slope Low strength	Poorly suited Slope Landslides Low strength	Severe Low strength
Fedscreek	Severe Landslides Slope	Poorly suited Slope Landslides	Moderate Low strength
Ho:			
Holly	Severe Flooding Low strength	Poorly suited Flooding Wetness Low strength	Severe Low strength

Table 8.—Forest Management, Part I—Continued

Map symbol and soil name	Limitations affecting construction of haul roads and log landings	Suitability for log landings	Soil rutting hazard
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
MaF:			
Marrowbone	Severe Landslides Slope	Poorly suited Slope Landslides	Moderate Low strength
Blairton	Severe Landslides Slope	Poorly suited Slope Landslides Low strength Wetness	Severe Low strength
Dekalb	Severe Landslides Slope	Poorly suited Slope Landslides	Slight
NeD:			
Nelse	Severe Flooding Landslides Slope	Poorly suited Flooding Slope Landslides	Moderate Low strength
Or:			
Orrville	Severe Flooding Low strength	Poorly suited Flooding Low strength Wetness	Severe Low strength
RaF:			
Rayne	Severe Landslides Slope Low strength	Poorly suited Slope Landslides Low strength	Severe Low strength
Marrowbone	Severe Landslides Slope	Poorly suited Slope Landslides	Moderate Low strength
Dekalb	Severe Landslides Slope	Poorly suited Slope Landslides	Slight
RoF:			
Rigley	Severe Landslides Slope	Poorly suited Slope Landslides	Moderate Low strength
Rock outcrop	Not rated	Not rated	Not rated
SeE:			
Shelocta	Severe Landslides Slope Low strength	Poorly suited Landslides Slope Low strength	Severe Low strength
SgC:			
Shelocta	Moderate Landslides Low strength	Moderately suited Slope Low strength Landslides	Severe Low strength

Table 8.—Forest Management, Part I—Continued

Map symbol and soil name	Limitations affecting construction of haul roads and log landings	Suitability for log landings	Soil rutting hazard
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
SgC:			
Grigsby	Severe Flooding	Poorly suited Flooding	Moderate Low strength
Orrville	Severe Flooding Low strength	Poorly suited Flooding Low strength Wetness	Severe Low strength
ShF:			
Shelocta	Severe Landslides Slope Low strength	Poorly suited Slope Landslides Low strength	Severe Low strength
Hazleton	Severe Landslides Slope	Poorly suited Slope Landslides	Slight
Fedscreek	Severe Landslides Slope	Poorly suited Slope Landslides	Moderate Low strength
UdC:			
Udorthents	Slight	Moderately suited Slope	Slight
Urban land	Not rated	Not rated	Not rated
UdF:			
Udorthents	Severe Landslides Slope	Poorly suited Landslides Slope	Slight
Urban land	Not rated	Not rated	Not rated
UpC:			
Upshur	Moderate Low strength Stickiness/slope	Moderately suited Slope Low strength	Severe Low strength
Rarden	Moderate Low strength Stickiness/slope	Moderately suited Slope Low strength	Severe Low strength
UpD:			
Upshur	Severe Landslides Slope Stickiness/slope Low strength	Poorly suited Landslides Slope Low strength	Severe Low strength
Rarden	Severe Landslides Slope Stickiness/slope Low strength	Poorly suited Landslides Slope Low strength	Severe Low strength

Table 8.—Forest Management, Part I—Continued

Map symbol and soil name	Limitations affecting construction of haul roads and log landings	Suitability for log landings	Soil rutting hazard
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
UpF:			
Upshur	Severe Landslides Slope Low strength	Poorly suited Slope Landslides Low strength	Severe Low strength
Rarden	Severe Landslides Slope Low strength	Poorly suited Slope Landslides Low strength	Severe Low strength
VaF:			
Vandalia	Severe Landslides Slope Low strength	Poorly suited Slope Landslides Low strength	Severe Low strength
Beech	Severe Landslides Slope	Poorly suited Slope Landslides Low strength	Severe Low strength
VaF2:			
Vandalia	Severe Landslides Slope Low strength	Poorly suited Slope Landslides Low strength	Severe Low strength
Beech	Severe Landslides Slope Low strength	Poorly suited Slope Landslides Low strength	Severe Low strength
W:			
Water	Not rated	Not rated	Not rated

Table 8.—Forest Management, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Hazard of off-road or off-trail erosion	Hazard of erosion on roads and trails	Suitability for roads (natural surface)
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
AaB:			
Allegheny	Slight	Moderate Slope/erodibility	Moderately suited Low strength
AaC:			
Allegheny	Slight	Severe Slope/erodibility	Moderately suited Slope Low strength
AbB:			
Allegheny	Slight	Moderate Slope/erodibility	Moderately suited Low strength
AbC:			
Allegheny	Slight	Severe Slope/erodibility	Moderately suited Slope Low strength
AeB:			
Allegheny	Slight	Moderate Slope/erodibility	Poorly suited Flooding Low strength
BlC:			
Blairton	Slight	Severe Slope/erodibility	Moderately suited Slope Low strength Wetness
Cruze	Slight	Severe Slope/erodibility	Moderately suited Slope Low strength
Marrowbone	Slight	Moderate Slope/erodibility	Moderately suited Slope
BlD:			
Blairton	Moderate Slope/erodibility	Severe Slope/erodibility	Poorly suited Landslides Slope Low strength Wetness
Cruze	Moderate Slope/erodibility	Severe Slope/erodibility	Poorly suited Landslides Slope Low strength
Marrowbone	Moderate Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides
Ch:			
Chagrin	Slight	Slight	Poorly suited Flooding Low strength

Table 8.—Forest Management, Part II—Continued

Map symbol and soil name	Hazard of off-road or off-trail erosion	Hazard of erosion on roads and trails	Suitability for roads (natural surface)
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
ClF:			
Cloverlick	Very severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides Low strength
Hazleton	Very severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides
Shelocta	Very severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides Low strength
CmB:			
Cotaco	Slight	Slight	Moderately suited Low strength
CmC:			
Cotaco	Slight	Moderate Slope/erodibility	Moderately suited Low strength Slope
CoB:			
Cotaco	Slight	Slight	Moderately suited Low strength
CoC:			
Cotaco	Slight	Moderate Slope/erodibility	Moderately suited Low strength Slope
CtB:			
Cotaco	Slight	Slight	Poorly suited Flooding Low strength
DAM:			
Dams, large	Not rated	Not rated	Not rated
Dm:			
Dumps, mine; tailings; and tipples	Not rated	Not rated	Not rated
FiB:			
Fiveblock	Slight	Slight	Well suited
Fairpoint	Slight	Slight	Moderately suited Low strength
Kaymine	Slight	Slight	Well suited
FiD:			
Fiveblock	Moderate Slope/erodibility	Severe Slope/erodibility	Poorly suited Landslides Slope
Fairpoint	Moderate Slope/erodibility	Severe Slope/erodibility	Poorly suited Landslides Slope Low strength

Table 8.—Forest Management, Part II—Continued

Map symbol and soil name	Hazard of off-road or off-trail erosion	Hazard of erosion on roads and trails	Suitability for roads (natural surface)
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
FiD:			
Kaymine	Moderate Slope/erodibility	Severe Slope/erodibility	Poorly suited Landslides Slope
FiF:			
Fiveblock	Very severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides
Fairpoint	Very severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides Low strength
Kaymine	Very severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides
Gr:			
Grigsby	Slight	Slight	Poorly suited Flooding
HaC:			
Hayter	Slight	Severe Slope/erodibility	Moderately suited Slope Low strength Landslides
Grigsby	Slight	Slight	Poorly suited Flooding
HnF:			
Hazleton	Very severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides
Shelocta	Very severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides Low strength
Fedscreek	Very severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides
Ho:			
Holly	Slight	Slight	Poorly suited Flooding Wetness Low strength
MaF:			
Marrowbone	Severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides

Table 8.—Forest Management, Part II—Continued

Map symbol and soil name	Hazard of off-road or off-trail erosion	Hazard of erosion on roads and trails	Suitability for roads (natural surface)
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
MaF:			
Blairton	Severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides Low strength Wetness
Dekalb	Severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides
NeD:			
Nelse	Moderate Slope/erodibility	Moderate Slope/erodibility	Poorly suited Flooding Slope Landslides
Or:			
Orrville	Slight	Slight	Poorly suited Flooding Low strength Wetness
RaF:			
Rayne	Severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides Low strength
Marrowbone	Severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides
Dekalb	Severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides
RoF:			
Rigley	Severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides
Rock outcrop	Not rated	Not rated	Not rated
SeE:			
Shelocta	Moderate Slope/erodibility	Severe Slope/erodibility	Poorly suited Landslides Slope Low strength
SgC:			
Shelocta	Slight	Severe Slope/erodibility	Moderately suited Slope Low strength Landslides
Grigsby	Slight	Slight	Poorly suited Flooding
Orrville	Slight	Slight	Poorly suited Flooding Low strength Wetness

Table 8.—Forest Management, Part II—Continued

Map symbol and soil name	Hazard of off-road or off-trail erosion	Hazard of erosion on roads and trails	Suitability for roads (natural surface)
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
ShF:			
Shelocta	Severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides Low strength
Hazleton	Severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides
Fedscreek	Severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides
UdC:			
Udorthents	Slight	Moderate Slope/erodibility	Moderately suited Slope
Urban land	Not rated	Not rated	Not rated
UdF:			
Udorthents	Very severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Landslides Slope
Urban land	Not rated	Not rated	Not rated
UpC:			
Upshur	Slight	Severe Slope/erodibility	Moderately suited Slope Low strength
Rarden	Slight	Severe Slope/erodibility	Moderately suited Slope Low strength
UpD:			
Upshur	Moderate Slope/erodibility	Severe Slope/erodibility	Poorly suited Landslides Slope Low strength
Rarden	Moderate Slope/erodibility	Severe Slope/erodibility	Poorly suited Landslides Slope Low strength
UpF:			
Upshur	Very severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides Low strength
Rarden	Severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides Low strength

Table 8.—Forest Management, Part II—Continued

Map symbol and soil name	Hazard of off-road or off-trail erosion	Hazard of erosion on roads and trails	Suitability for roads (natural surface)
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
VaF, VaF2:			
Vandalia	Severe Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides Low strength
Beech	Moderate Slope/erodibility	Severe Slope/erodibility	Poorly suited Slope Landslides Low strength
W:			
Water	Not rated	Not rated	Not rated

Table 8.—Forest Management, Part III

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Suitability for hand planting	Suitability for mechanical planting	Suitability for use of harvesting equipment
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
AaB:			
Allegheny	Well suited	Well suited	Moderately suited Low strength
AaC:			
Allegheny	Well suited	Moderately suited Slope	Moderately suited Low strength
AbB:			
Allegheny	Well suited	Well suited	Moderately suited Low strength
AbC:			
Allegheny	Well suited	Moderately suited Slope	Moderately suited Low strength
AeB:			
Allegheny	Well suited	Well suited	Moderately suited Low strength
BlC:			
Blairton	Well suited	Moderately suited Rock fragments Slope	Moderately suited Low strength
Cruze	Well suited	Moderately suited Slope	Moderately suited Low strength
Marrowbone	Moderately suited Rock fragments	Moderately suited Rock fragments Slope	Well suited
BlD:			
Blairton	Well suited	Poorly suited Slope Rock fragments	Moderately suited Low strength
Cruze	Well suited	Poorly suited Slope	Moderately suited Low strength
Marrowbone	Moderately suited Rock fragments	Poorly suited Slope Rock fragments	Well suited
Ch:			
Chagrin	Well suited	Well suited	Moderately suited Low strength
ClF:			
Cloverlick	Moderately suited Rock fragments Slope	Unsuited Slope Rock fragments	Poorly suited Slope Low strength
Hazleton	Moderately suited Slope Rock fragments	Unsuited Slope Rock fragments	Poorly suited Slope

Table 8.—Forest Management, Part III—Continued

Map symbol and soil name	Suitability for hand planting	Suitability for mechanical planting	Suitability for use of harvesting equipment
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
ClF:			
Shelocta	Moderately suited Slope	Unsuited Slope Rock fragments	Poorly suited Slope Low strength
CmB:			
Cotaco	Well suited	Well suited	Moderately suited Low strength
CmC:			
Cotaco	Well suited	Moderately suited Slope	Moderately suited Low strength
CoB:			
Cotaco	Well suited	Well suited	Moderately suited Low strength
CoC:			
Cotaco	Well suited	Moderately suited Slope	Moderately suited Low strength
CtB:			
Cotaco	Well suited	Well suited	Moderately suited Low strength
DAM:			
Dams, large	Not rated	Not rated	Not rated
Dm:			
Dumps, mine; tailings; and tipples	Not rated	Not rated	Not rated
FiB:			
Fiveblock	Moderately suited Rock fragments Sandiness	Unsuited Rock fragments Sandiness	Well suited
Fairpoint	Moderately suited Rock fragments	Poorly suited Rock fragments	Moderately suited Low strength
Kaymine	Moderately suited Rock fragments	Unsuited Rock fragments	Well suited
FiD:			
Fiveblock	Moderately suited Rock fragments Sandiness	Unsuited Rock fragments Slope Sandiness	Well suited
Fairpoint	Moderately suited Rock fragments	Poorly suited Slope Rock fragments	Moderately suited Low strength
Kaymine	Moderately suited Rock fragments	Unsuited Rock fragments Slope	Well suited
FiF:			
Fiveblock	Moderately suited Rock fragments Sandiness Slope	Unsuited Slope Rock fragments Sandiness	Poorly suited Slope

Table 8.—Forest Management, Part III—Continued

Map symbol and soil name	Suitability for hand planting	Suitability for mechanical planting	Suitability for use of harvesting equipment
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
FiF:			
Fairpoint	Moderately suited Slope Rock fragments	Unsuited Slope Rock fragments	Poorly suited Slope Low strength
Kaymine	Moderately suited Rock fragments Slope	Unsuited Slope Rock fragments	Poorly suited Slope
Gr:			
Grigsby	Well suited	Well suited	Well suited
HaC:			
Hayter	Well suited	Moderately suited Slope Rock fragments	Moderately suited Low strength
Grigsby	Well suited	Well suited	Well suited
HnF:			
Hazleton	Moderately suited Slope Rock fragments	Unsuited Slope Rock fragments	Poorly suited Slope
Shelocta	Moderately suited Slope	Unsuited Slope Rock fragments	Poorly suited Slope Low strength
Fedscreek	Moderately suited Slope Rock fragments	Unsuited Slope Rock fragments	Poorly suited Slope
Ho:			
Holly	Well suited	Well suited	Moderately suited Low strength
MaF:			
Marrowbone	Moderately suited Slope Rock fragments	Unsuited Slope Rock fragments	Poorly suited Slope
Blairton	Well suited	Unsuited Slope Rock fragments	Moderately suited Low strength Slope
Dekalb	Moderately suited Rock fragments Slope	Unsuited Slope Rock fragments	Poorly suited Slope
NeD:			
Nelse	Well suited	Moderately suited Slope	Well suited
Or:			
Orrville	Well suited	Well suited	Moderately suited Low strength
RaF:			
Rayne	Moderately suited Slope	Unsuited Slope Rock fragments	Poorly suited Slope Low strength

Table 8.—Forest Management, Part III—Continued

Map symbol and soil name	Suitability for hand planting	Suitability for mechanical planting	Suitability for use of harvesting equipment
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
RaF:			
Marrowbone	Moderately suited Slope Rock fragments	Unsuited Slope Rock fragments	Poorly suited Slope
Dekalb	Moderately suited Rock fragments Slope	Unsuited Slope Rock fragments	Poorly suited Slope
RoF:			
Rigley	Moderately suited Slope	Unsuited Slope	Poorly suited Slope
Rock outcrop	Not rated	Not rated	Not rated
SeE:			
Shelocta	Well suited	Poorly suited Slope Rock fragments	Moderately suited Low strength Slope
SgC:			
Shelocta	Well suited	Moderately suited Slope Rock fragments	Moderately suited Low strength
Grigsby	Well suited	Well suited	Well suited
Orrville	Well suited	Well suited	Moderately suited Low strength
ShF:			
Shelocta	Moderately suited Slope	Unsuited Slope Rock fragments	Poorly suited Slope Low strength
Hazleton	Moderately suited Slope Rock fragments	Unsuited Slope Rock fragments	Poorly suited Slope
Fedscreek	Moderately suited Slope Rock fragments	Unsuited Slope Rock fragments	Poorly suited Slope
UdC:			
Udorthents	Well suited	Moderately suited Slope	Well suited
Urban land	Not rated	Not rated	Not rated
UdF:			
Udorthents	Moderately suited Slope	Unsuited Slope	Poorly suited Slope
Urban land	Not rated	Not rated	Not rated
UpC:			
Upshur	Moderately suited Stickiness; high plasticity index	Moderately suited Rock fragments Stickiness; high plasticity index Slope	Moderately suited Low strength

Table 8.—Forest Management, Part III—Continued

Map symbol and soil name	Suitability for hand planting	Suitability for mechanical planting	Suitability for use of harvesting equipment
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
UpC:			
Rarden	Poorly suited Stickiness; high plasticity index	Poorly suited Stickiness; high plasticity index Slope	Moderately suited Low strength
UpD:			
Upshur	Moderately suited Stickiness; high plasticity index	Poorly suited Slope Rock fragments Stickiness; high plasticity index	Moderately suited Low strength
Rarden	Poorly suited Stickiness; high plasticity index	Poorly suited Slope Stickiness; high plasticity index	Moderately suited Low strength
UpF:			
Upshur	Moderately suited Stickiness; high plasticity index Slope	Unsuited Slope Rock fragments Stickiness; high plasticity index	Poorly suited Slope Low strength
Rarden	Poorly suited Stickiness; high plasticity index Slope	Unsuited Slope Stickiness; high plasticity index	Poorly suited Slope Low strength
VaF, VaF2:			
Vandalia	Moderately suited Slope Stickiness; high plasticity index	Unsuited Slope Stickiness; high plasticity index	Poorly suited Slope Low strength
Beech	Well suited	Unsuited Slope	Moderately suited Low strength Slope
W:			
Water	Not rated	Not rated	Not rated

Table 9.—Recreational Development, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
AaB:			
Allegheny	Not limited	Not limited	Somewhat limited Slope
AaC:			
Allegheny	Somewhat limited Slope	Somewhat limited Slope	Very limited Slope
AbB:			
Allegheny	Very limited Flooding	Not limited	Somewhat limited Slope
AbC:			
Allegheny	Very limited Flooding Slope	Somewhat limited Slope	Very limited Slope
AeB:			
Allegheny	Very limited Flooding	Not limited	Somewhat limited Flooding Slope
BlC:			
Blairton	Somewhat limited Depth to saturated zone Restricted permeability Slope	Somewhat limited Depth to saturated zone Restricted permeability Slope	Very limited Slope Depth to saturated zone Restricted permeability Gravel content Depth to bedrock
Cruze	Somewhat limited Restricted permeability Depth to saturated zone Slope	Somewhat limited Restricted permeability Slope Depth to saturated zone	Very limited Slope Restricted permeability Depth to saturated zone Gravel content
Marrowbone	Somewhat limited Slope	Somewhat limited Slope	Very limited Slope Depth to bedrock
BlD:			
Blairton	Very limited Slope Depth to saturated zone Restricted permeability	Very limited Slope Depth to saturated zone Restricted permeability	Very limited Slope Depth to saturated zone Restricted permeability Gravel content Depth to bedrock

Table 9.—Recreational Development, Part I—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
BlD:			
Cruze	Very limited Slope Restricted permeability Depth to saturated zone	Very limited Slope Restricted permeability Depth to saturated zone	Very limited Slope Restricted permeability Depth to saturated zone Gravel content
Marrowbone	Very limited Slope	Very limited Slope	Very limited Slope Depth to bedrock
Ch:			
Chagrin	Very limited Flooding	Somewhat limited Flooding	Very limited Flooding
ClF:			
Cloverlick	Very limited Slope Too stony Content of large stones	Very limited Slope Too stony Content of large stones	Very limited Slope Content of large stones Gravel content Too stony
Hazleton	Very limited Slope Too stony Content of large stones	Very limited Slope Too stony Content of large stones	Very limited Slope Content of large stones Gravel content Too stony
Shelocta	Very limited Slope Too stony	Very limited Slope Too stony	Very limited Slope Too stony Gravel content
CmB:			
Cotaco	Somewhat limited Depth to saturated zone	Somewhat limited Depth to saturated zone	Somewhat limited Depth to saturated zone Gravel content
CmC:			
Cotaco	Somewhat limited Depth to saturated zone	Somewhat limited Depth to saturated zone	Very limited Slope Depth to saturated zone Gravel content
CoB:			
Cotaco	Very limited Flooding Depth to saturated zone	Somewhat limited Depth to saturated zone	Somewhat limited Depth to saturated zone Gravel content
CoC:			
Cotaco	Very limited Flooding Depth to saturated zone	Somewhat limited Depth to saturated zone	Very limited Slope Depth to saturated zone Gravel content

Table 9.—Recreational Development, Part I—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
CtB:			
Cotaco	Very limited Flooding Depth to saturated zone	Somewhat limited Depth to saturated zone	Somewhat limited Flooding Depth to saturated zone Gravel content
DAM:			
Dams, large	Not rated	Not rated	Not rated
Dm:			
Dumps, mine; tailings; and tipples	Not rated	Not rated	Not rated
FiB:			
Fiveblock	Somewhat limited Gravel content	Somewhat limited Gravel content	Very limited Gravel content Content of large stones Slope
Fairpoint	Somewhat limited Restricted permeability Gravel content	Somewhat limited Restricted permeability Gravel content	Very limited Gravel content Restricted permeability Slope Content of large stones
Kaymine	Somewhat limited Gravel content Content of large stones	Somewhat limited Gravel content Content of large stones	Very limited Gravel content Content of large stones Slope
FiD, FiF:			
Fiveblock	Very limited Slope Gravel content	Very limited Slope Gravel content	Very limited Slope Gravel content Content of large stones
Fairpoint	Very limited Slope Restricted permeability Gravel content	Very limited Slope Restricted permeability Gravel content	Very limited Slope Gravel content Restricted permeability Content of large stones
Kaymine	Very limited Slope Gravel content Content of large stones	Very limited Slope Gravel content Content of large stones	Very limited Gravel content Slope Content of large stones
Gr:			
Grigsby	Very limited Flooding Too sandy	Somewhat limited Flooding Too sandy	Very limited Flooding Too sandy

Table 9.—Recreational Development, Part I—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
HaC:			
Hayter	Very limited Flooding Slope	Somewhat limited Slope	Very limited Slope
Grigsby	Very limited Flooding Too sandy	Somewhat limited Flooding Too sandy	Very limited Flooding Too sandy
HnF:			
Hazleton	Very limited Slope Too stony Content of large stones	Very limited Slope Too stony Content of large stones	Very limited Slope Content of large stones Gravel content Too stony
Shelocta	Very limited Slope Too stony	Very limited Slope Too stony	Very limited Slope Too stony Gravel content
Fedscreek	Very limited Slope	Very limited Slope	Very limited Slope
Ho:			
Holly	Very limited Depth to saturated zone Flooding	Very limited Depth to saturated zone Flooding	Very limited Depth to saturated zone Flooding
MaF:			
Marrowbone	Very limited Slope	Very limited Slope	Very limited Slope Depth to bedrock
Blairton	Very limited Slope Depth to saturated zone Restricted permeability	Very limited Slope Depth to saturated zone Restricted permeability	Very limited Slope Depth to saturated zone Restricted permeability Depth to bedrock
Dekalb	Very limited Slope Content of large stones	Very limited Slope Content of large stones	Very limited Slope Content of large stones Gravel content Depth to bedrock
NeD:			
Nelse	Very limited Flooding Slope	Very limited Slope Flooding	Very limited Flooding Slope
Or:			
Orrville	Very limited Depth to saturated zone Flooding	Very limited Depth to saturated zone Flooding	Very limited Depth to saturated zone Flooding

Table 9.—Recreational Development, Part I—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
RaF:			
Rayne	Very limited Slope Restricted permeability	Very limited Slope Restricted permeability	Very limited Slope Restricted permeability Gravel content Content of large stones
Marrowbone	Very limited Slope	Very limited Slope	Very limited Slope Depth to bedrock
Dekalb	Very limited Slope Content of large stones	Very limited Slope Content of large stones	Very limited Slope Content of large stones Gravel content Depth to bedrock
RoF:			
Rigley	Very limited Slope Too sandy	Very limited Slope Too sandy	Very limited Slope Gravel content Too sandy Content of large stones
Rock outcrop	Not rated	Not rated	Not rated
SeE:			
Shelocta	Very limited Slope	Very limited Slope	Very limited Slope Gravel content
SgC:			
Shelocta	Somewhat limited Slope	Somewhat limited Slope	Very limited Slope Gravel content
Grigsby	Very limited Flooding Too sandy	Somewhat limited Flooding Too sandy	Very limited Flooding Too sandy
Orrville	Very limited Depth to saturated zone Flooding	Very limited Depth to saturated zone Flooding	Very limited Depth to saturated zone Flooding
ShF:			
Shelocta	Very limited Slope	Very limited Slope	Very limited Slope Gravel content
Hazleton	Very limited Slope Content of large stones	Very limited Slope Content of large stones	Very limited Slope Content of large stones Gravel content
Fedscreek	Very limited Slope	Very limited Slope	Very limited Slope

Table 9.—Recreational Development, Part I—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
UdC, UdF:			
Udorthents-Urban land	Not rated	Not rated	Not rated
UpC:			
Upshur	Somewhat limited Restricted permeability Slope	Somewhat limited Restricted permeability Slope	Very limited Slope Restricted permeability
Rarden	Somewhat limited Restricted permeability Depth to saturated zone Slope	Somewhat limited Restricted permeability Slope Depth to saturated zone	Very limited Slope Restricted permeablity Depth to bedrock Depth to saturated zone
UpD, UpF:			
Upshur	Very limited Slope Restricted permeability	Very limited Slope Restricted permeability	Very limited Slope Restricted permeability
Rarden	Very limited Slope Restricted permeability Depth to saturated zone	Very limited Slope Restricted permeability Depth to saturated zone	Very limited Slope Restricted permeability Depth to bedrock Depth to saturated zone
VaF:			
Vandalia	Very limited Slope Restricted permeability	Very limited Slope Restricted permeability	Very limited Slope Gravel content Restricted permeability
Beech	Very limited Slope Depth to saturated zone	Very limited Slope Depth to saturated zone	Very limited Slope Depth to saturated zone
VaF2:			
Vandalia	Very limited Slope Restricted permeability	Very limited Slope Restricted permeability	Very limited Slope Gravel content Restricted permeability
Beech	Very limited Slope Depth to saturated zone	Very limited Slope Depth to saturated zone	Very limited Slope Depth to saturated zone
W:			
Water	Not rated	Not rated	Not rated

Table 9.—Recreational Development, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Paths and trails	Off-road motorcycle trails	Golf fairways
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
AaB:			
Allegheny	Not limited	Not limited	Not limited
AaC:			
Allegheny	Not limited	Not limited	Somewhat limited Slope
AbB:			
Allegheny	Not limited	Not limited	Not limited
AbC:			
Allegheny	Not limited	Not limited	Somewhat limited Slope
AeB:			
Allegheny	Not limited	Not limited	Somewhat limited Flooding
BlC:			
Blairton	Very limited Water erosion Depth to saturated zone	Very limited Water erosion Depth to saturated zone	Somewhat limited Depth to saturated zone Slope Depth to bedrock Droughty
Cruze	Very limited Water erosion	Very limited Water erosion	Somewhat limited Slope Depth to saturated zone
Marrowbone	Not limited	Not limited	Somewhat limited Depth to bedrock Slope
BlD:			
Blairton	Very limited Water erosion Slope Depth to saturated zone	Very limited Water erosion Depth to saturated zone	Very limited Slope Depth to saturated zone Depth to bedrock Droughty
Cruze	Very limited Water erosion Slope	Very limited Water erosion	Very limited Slope Depth to saturated zone
Marrowbone	Somewhat limited Slope	Not limited	Very limited Slope Depth to bedrock
Ch:			
Chagrin	Somewhat limited Flooding	Somewhat limited Flooding	Very limited Flooding

Table 9.—Recreational Development, Part II—Continued

Map symbol and soil name	Paths and trails	Off-road motorcycle trails	Golf fairways
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
ClF:			
Cloverlick	Very limited Slope Too stony Content of large stones	Very limited Slope Too stony Content of large stones	Very limited Slope Content of large stones
Hazleton	Very limited Slope Too stony Content of large stones	Very limited Slope Too stony Content of large stones	Very limited Slope Content of large stones Droughty
Shelocta	Very limited Slope Too stony	Very limited Slope Too stony	Very limited Slope
CmB, CmC, CoB, CoC:			
Cotaco	Not limited	Not limited	Somewhat limited Depth to saturated zone
CtB:			
Cotaco	Not limited	Not limited	Somewhat limited Flooding Depth to saturated zone
DAM:			
Dams, large	Not rated	Not rated	Not rated
Dm:			
Dumps, mine; tailings; and tipples	Not rated	Not rated	Not rated
FiB:			
Fiveblock	Not limited	Not limited	Somewhat limited Gravel content Content of large stones Droughty
Fairpoint	Not limited	Not limited	Somewhat limited Droughty Gravel content Content of large stones
Kaymine	Somewhat limited Content of large stones	Somewhat limited Content of large stones	Very limited Content of large stones Gravel content
FiD:			
Fiveblock	Somewhat limited Slope	Not limited	Very limited Slope Gravel content Content of large stones Droughty

Table 9.—Recreational Development, Part II—Continued

Map symbol and soil name	Paths and trails	Off-road motorcycle trails	Golf fairways
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
FiD:			
Fairpoint	Somewhat limited Slope	Not limited	Very limited Slope Droughty Gravel content Content of large stones
Kaymine	Somewhat limited Slope Content of large stones	Somewhat limited Content of large stones	Very limited Slope Content of large stones Gravel content
FiF:			
Fiveblock	Very limited Slope	Very limited Slope	Very limited Slope Gravel content Content of large stones Droughty
Fairpoint	Very limited Slope	Very limited Slope	Very limited Slope Droughty Gravel content Content of large stones
Kaymine	Very limited Slope Content of large stones	Very limited Slope Content of large stones	Very limited Slope Content of large stones Gravel content
Gr:			
Grigsby	Somewhat limited Flooding Too sandy	Somewhat limited Flooding Too sandy	Very limited Flooding
HaC:			
Hayter	Not limited	Not limited	Somewhat limited Slope
Grigsby	Somewhat limited Flooding Too sandy	Somewhat limited Flooding Too sandy	Very limited Flooding
HnF:			
Hazleton	Very limited Slope Too stony Content of large stones	Very limited Slope Too stony Content of large stones	Very limited Slope Content of large stones Droughty
Shelocta	Very limited Slope Too stony	Very limited Slope Too stony	Very limited Slope
Fedscreek	Very limited Slope	Very limited Slope	Very limited Slope

Table 9.—Recreational Development, Part II—Continued

Map symbol and soil name	Paths and trails	Off-road motorcycle trails	Golf fairways
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
Ho:			
Holly	Very limited Depth to saturated zone Flooding	Very limited Depth to saturated zone Flooding	Very limited Flooding Depth to saturated zone
MaF:			
Marrowbone	Very limited Slope	Very limited Slope	Very limited Slope Depth to bedrock
Blairton	Very limited Slope Water erosion Depth to saturated zone	Very limited Water erosion Slope Depth to saturated zone	Very limited Slope Depth to saturated zone Droughty Depth to bedrock
Dekalb	Very limited Slope Content of large stones	Very limited Slope Content of large stones	Very limited Slope Content of large stones Droughty Depth to bedrock
NeD:			
Nelse	Somewhat limited Flooding	Somewhat limited Flooding	Very limited Flooding Slope
Or:			
Orrville	Very limited Depth to saturated zone Flooding	Very limited Depth to saturated zone Flooding	Very limited Flooding Depth to saturated zone
RaF:			
Rayne	Very limited Slope	Very limited Slope	Very limited Slope Content of large stones
Marrowbone	Very limited Slope	Very limited Slope	Very limited Slope Depth to bedrock
Dekalb	Very limited Slope Content of large stones	Very limited Slope Content of large stones	Very limited Slope Content of large stones Droughty Depth to bedrock
RoF:			
Rigley	Very limited Slope Too sandy	Very limited Slope Too sandy	Very limited Slope Content of large stones
Rock outcrop	Not rated	Not rated	Not rated

Table 9.—Recreational Development, Part II—Continued

Map symbol and soil name	Paths and trails	Off-road motorcycle trails	Golf fairways
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
SeE:			
Shelocta	Somewhat limited Slope	Not limited	Very limited Slope
SgC:			
Shelocta	Not limited	Not limited	Somewhat limited Slope
Grigsby	Somewhat limited Flooding Too sandy	Somewhat limited Flooding Too sandy	Very limited Flooding
Orrville	Very limited Depth to saturated zone Flooding	Very limited Depth to saturated zone Flooding	Very limited Flooding Depth to saturated zone
ShF:			
Shelocta	Very limited Slope	Very limited Slope	Very limited Slope
Hazleton	Very limited Slope Content of large stones	Very limited Slope Content of large stones	Very limited Slope Content of large stones Droughty
Fedscreek	Very limited Slope	Very limited Slope	Very limited Slope
UdC, UdF:			
Udorthents-Urban land	Not rated	Not rated	Not rated
UpC:			
Upshur	Very limited Water erosion	Very limited Water erosion	Somewhat limited Slope
Rarden	Very limited Water erosion	Very limited Water erosion	Somewhat limited Depth to bedrock Droughty Slope Depth to saturated zone
UpD:			
Upshur	Very limited Water erosion Slope	Very limited Water erosion	Very limited Slope
Rarden	Very limited Water erosion Slope	Very limited Water erosion	Very limited Slope Depth to bedrock Droughty Depth to saturated zone
UpF:			
Upshur	Very limited Slope Water erosion	Very limited Water erosion Slope	Very limited Slope

Table 9.—Recreational Development, Part II—Continued

Map symbol and soil name	Paths and trails	Off-road motorcycle trails	Golf fairways
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
UpF:			
Rarden	Very limited Slope Water erosion	Very limited Water erosion Slope	Very limited Slope Depth to bedrock Droughty Depth to saturated zone
VaF, VaF2:			
Vandalia	Very limited Water erosion Slope	Very limited Water erosion Slope	Very limited Slope
Beech	Very limited Slope	Somewhat limited Slope	Very limited Slope Depth to saturated zone
W:			
Water	Not rated	Not rated	Not rated

Table 10.—Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
AaB:			
Allegheny	Not limited	Not limited	Not limited
AaC:			
Allegheny	Somewhat limited Slope	Somewhat limited Slope	Very limited Slope
AbB:			
Allegheny	Very limited Flooding	Very limited Flooding	Very limited Flooding
AbC:			
Allegheny	Very limited Flooding Slope	Very limited Flooding Slope	Very limited Flooding Slope
AeB:			
Allegheny	Very limited Flooding	Very limited Flooding	Very limited Flooding
BlC:			
Blairton	Somewhat limited Depth to saturated zone Slope	Very limited Depth to saturated zone Slope Depth to soft bedrock	Very limited Slope Depth to saturated zone
Cruze	Very limited Shrink-swell Depth to saturated zone Slope Content of large stones	Very limited Depth to saturated zone Shrink-swell Slope Content of large stones	Very limited Shrink-swell Slope Depth to saturated zone Content of large stones
Marrowbone	Somewhat limited Depth to hard bedrock Slope	Very limited Depth to hard bedrock Slope	Very limited Slope Depth to hard bedrock
BlD:			
Blairton	Very limited Slope Depth to saturated zone	Very limited Depth to saturated zone Slope Depth to soft bedrock	Very limited Slope Depth to saturated zone
Cruze	Very limited Shrink-swell Slope Depth to saturated zone Content of large stones	Very limited Depth to saturated zone Shrink-swell Slope Content of large stones	Very limited Slope Shrink-swell Depth to saturated zone Content of large stones

Table 10.—Building Site Development—Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
BlD:			
Marrowbone----------	Very limited Slope Depth to hard bedrock	Very limited Depth to hard bedrock Slope	Very limited Slope Depth to hard bedrock
Ch:			
Chagrin----------	Very limited Flooding	Very limited Flooding Depth to saturated zone	Very limited Flooding
ClF:			
Cloverlick----------	Very limited Slope Content of large stones	Very limited Slope Content of large stones	Very limited Slope Content of large stones
Hazleton----------	Very limited Slope Content of large stones	Very limited Slope Content of large stones	Very limited Slope Content of large stones
Shelocta----------	Very limited Slope	Very limited Slope	Very limited Slope
CmB:			
Cotaco----------	Somewhat limited Depth to saturated zone	Very limited Depth to saturated zone	Somewhat limited Depth to saturated zone
CmC:			
Cotaco----------	Somewhat limited Depth to saturated zone	Very limited Depth to saturated zone	Very limited Slope Depth to saturated zone
CoB:			
Cotaco----------	Very limited Flooding Depth to saturated zone	Very limited Flooding Depth to saturated zone	Very limited Flooding Depth to saturated zone
CoC:			
Cotaco----------	Very limited Flooding Depth to saturated zone	Very limited Flooding Depth to saturated zone	Very limited Flooding Slope Depth to saturated zone
CtB:			
Cotaco----------	Very limited Flooding Depth to saturated zone	Very limited Flooding Depth to saturated zone	Very limited Flooding Depth to saturated zone
DAM:			
Dams, large---------	Not rated	Not rated	Not rated
Dm:			
Dumps, mine; tailings; and tipples--	Not rated	Not rated	Not rated

Table 10.—Building Site Development—Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
FiB:			
Fiveblock	Very limited Content of large stones	Very limited Content of large stones	Very limited Content of large stones
Fairpoint	Very limited Content of large stones Shrink-swell	Very limited Content of large stones Shrink-swell	Very limited Content of large stones Shrink-swell
Kaymine	Very limited Content of large stones	Very limited Content of large stones	Very limited Content of large stones
FiD:			
Fiveblock	Very limited Content of large stones Slope	Very limited Content of large stones Slope	Very limited Slope Content of large stones
Fairpoint	Very limited Slope Content of large stones Shrink-swell	Very limited Slope Content of large stones Shrink-swell	Very limited Slope Content of large stones Shrink-swell
Kaymine	Very limited Content of large stones Slope	Very limited Content of large stones Slope	Very limited Slope Content of large stones
FiF:			
Fiveblock	Very limited Slope Content of large stones	Very limited Slope Content of large stones	Very limited Slope Content of large stones
Fairpoint	Very limited Slope Content of large stones Shrink-swell	Very limited Slope Content of large stones Shrink-swell	Very limited Slope Content of large stones Shrink-swell
Kaymine	Very limited Slope Content of large stones	Very limited Slope Content of large stones	Very limited Slope Content of large stones
Gr:			
Grigsby	Very limited Flooding	Very limited Flooding Depth to saturated zone	Very limited Flooding
HaC:			
Hayter	Very limited Flooding Shrink-swell Slope	Very limited Flooding Shrink-swell Slope	Very limited Flooding Slope Shrink-swell
Grigsby	Very limited Flooding	Very limited Flooding Depth to saturated zone	Very limited Flooding

Table 10.—Building Site Development—Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
HnF:			
Hazleton	Very limited Slope Content of large stones	Very limited Slope Content of large stones	Very limited Slope Content of large stones
Shelocta	Very limited Slope	Very limited Slope	Very limited Slope
Fedscreek	Very limited Slope	Very limited Slope	Very limited Slope
Ho:			
Holly	Very limited Flooding Depth to saturated zone	Very limited Flooding Depth to saturated zone	Very limited Flooding Depth to saturated zone
MaF:			
Marrowbone	Very limited Slope Depth to hard bedrock	Very limited Slope Depth to hard bedrock	Very limited Slope Depth to hard bedrock
Blairton	Very limited Slope Depth to saturated zone	Very limited Slope Depth to saturated zone Depth to soft bedrock	Very limited Slope Depth to saturated zone
Dekalb	Very limited Slope Content of large stones Depth to hard bedrock	Very limited Slope Depth to hard bedrock Content of large stones	Very limited Slope Content of large stones Depth to hard bedrock
NeD:			
Nelse	Very limited Flooding Slope	Very limited Flooding Slope Depth to saturated zone	Very limited Flooding Slope
Or:			
Orrville	Very limited Flooding Depth to saturated zone	Very limited Flooding Depth to saturated zone	Very limited Flooding Depth to saturated zone
RaF:			
Rayne	Very limited Slope Shrink-swell	Very limited Slope Shrink-swell	Very limited Slope Shrink-swell
Marrowbone	Very limited Slope Depth to hard bedrock	Very limited Slope Depth to hard bedrock	Very limited Slope Depth to hard bedrock

Table 10.—Building Site Development—Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
RaF:			
Dekalb	Very limited Slope Content of large stones Depth to hard bedrock	Very limited Slope Depth to hard bedrock Content of large stones	Very limited Slope Content of large stones Depth to hard bedrock
RoF:			
Rigley	Very limited Slope	Very limited Slope	Very limited Slope
Rock outcrop	Not rated	Not rated	Not rated
SeE:			
Shelocta	Very limited Slope	Very limited Slope	Very limited Slope
SgC:			
Shelocta	Somewhat limited Slope	Somewhat limited Slope	Very limited Slope
Grigsby	Very limited Flooding	Very limited Flooding Depth to saturated zone	Very limited Flooding
Orrville	Very limited Flooding Depth to saturated zone	Very limited Flooding Depth to saturated zone	Very limited Flooding Depth to saturated zone
ShF:			
Shelocta	Very limited Slope	Very limited Slope	Very limited Slope
Hazleton	Very limited Slope Content of large stones	Very limited Slope Content of large stones	Very limited Slope Content of large stones
Fedscreek	Very limited Slope	Very limited Slope	Very limited Slope
UdC, UdF:			
Udorthents-Urban land	Not rated	Not rated	Not rated
UpC:			
Upshur	Very limited Shrink-swell Slope	Very limited Shrink-swell Slope	Very limited Shrink-swell Slope
Rarden	Very limited Shrink-swell Depth to saturated zone Slope	Very limited Depth to saturated zone Shrink-swell Depth to soft bedrock Slope	Very limited Shrink-swell Slope Depth to saturated zone

Table 10.—Building Site Development—Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
UpD:			
Upshur	Very limited Shrink-swell Slope	Very limited Shrink-swell Slope	Very limited Slope Shrink-swell
Rarden	Very limited Shrink-swell Slope Depth to saturated zone	Very limited Depth to saturated zone Shrink-swell Slope Depth to soft bedrock	Very limited Slope Shrink-swell Depth to saturated zone
UpF:			
Upshur	Very limited Slope Shrink-swell	Very limited Slope Shrink-swell	Very limited Slope Shrink-swell
Rarden	Very limited Slope Shrink-swell Depth to saturated zone	Very limited Slope Depth to saturated zone Shrink-swell Depth to soft bedrock	Very limited Slope Shrink-swell Depth to saturated zone
VaF, VaF2:			
Vandalia	Very limited Slope Shrink-swell	Very limited Slope Shrink-swell Depth to saturated zone	Very limited Slope Shrink-swell
Beech	Very limited Slope Shrink-swell Depth to saturated zone	Very limited Slope Depth to saturated zone Shrink-swell	Very limited Slope Shrink-swell Depth to saturated zone
W:			
Water	Not rated	Not rated	Not rated

Table 11.—Sanitary Facilities, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons
	Rating class and limiting features	Rating class and limiting features
AaB:		
Allegheny	Very limited Seepage Restricted permeability	Very limited Seepage Slope
AaC:		
Allegheny	Very limited Seepage Restricted permeability Slope	Very limited Slope Seepage
AbB:		
Allegheny	Very limited Seepage Restricted permeability Flooding	Very limited Seepage Flooding Slope
AbC:		
Allegheny	Very limited Seepage Restricted permeability Flooding Slope	Very limited Slope Seepage Flooding
AeB:		
Allegheny	Very limited Flooding Seepage Restricted permeability	Very limited Flooding Seepage Slope
BlC:		
Blairton	Very limited Depth to bedrock Depth to saturated zone Restricted permeability Slope	Very limited Depth to soft bedrock Depth to saturated zone Slope Seepage
Cruze	Very limited Depth to saturated zone Restricted permeability Depth to bedrock Slope Content of large stones	Very limited Depth to saturated zone Slope Depth to soft bedrock

Table 11.—Sanitary Facilities, Part I—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons
	Rating class and limiting features	Rating class and limiting features
BlC:		
Marrowbone	Very limited Depth to bedrock Seepage Slope	Very limited Depth to hard bedrock Slope Seepage
BlD:		
Blairton	Very limited Depth to bedrock Depth to saturated zone Slope Restricted permeability	Very limited Depth to soft bedrock Slope Depth to saturated zone Seepage
Cruze	Very limited Depth to saturated zone Restricted permeability Slope Depth to bedrock Content of large stones	Very limited Slope Depth to saturated zone Depth to soft bedrock
Marrowbone	Very limited Depth to bedrock Slope Seepage	Very limited Depth to hard bedrock Slope Seepage
Ch:		
Chagrin	Very limited Flooding Restricted permeability Depth to saturated zone	Very limited Flooding Seepage
ClF:		
Cloverlick	Very limited Slope Content of large stones Seepage	Very limited Slope Seepage Content of large stones
Hazleton	Very limited Slope Seepage Content of large stones	Very limited Slope Seepage Content of large stones
Shelocta	Very limited Slope Seepage Depth to bedrock Restricted permeability	Very limited Slope Seepage Depth to soft bedrock

Table 11.—Sanitary Facilities, Part I—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons
	Rating class and limiting features	Rating class and limiting features
CmB:		
Cotaco	Very limited Depth to saturated zone Restricted permeability	Very limited Depth to saturated zone Seepage
CmC:		
Cotaco	Very limited Depth to saturated zone Restricted permeability	Very limited Depth to saturated zone Slope Seepage
CoB:		
Cotaco	Very limited Depth to saturated zone Restricted permeability Flooding	Very limited Depth to saturated zone Seepage Flooding
CoC:		
Cotaco	Very limited Depth to saturated zone Restricted permeability Flooding	Very limited Depth to saturated zone Slope Seepage Flooding
CtB:		
Cotaco	Very limited Flooding Depth to saturated zone Restricted permeability	Very limited Flooding Depth to saturated zone Seepage
DAM:		
Dams, large	Not rated	Not rated
Dm:		
Dumps, mine; tailings; and tipples	Not rated	Not rated
FiB:		
Fiveblock	Very limited Content of large stones Seepage	Very limited Seepage Content of large stones Slope
Fairpoint	Very limited Restricted permeability Content of large stones	Very limited Content of large stones Slope
Kaymine	Very limited Content of large stones Seepage	Very limited Content of large stones Seepage Slope

Table 11.—Sanitary Facilities, Part I—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons
	Rating class and limiting features	Rating class and limiting features
FiD:		
Fiveblock	Very limited Content of large stones Slope Seepage	Very limited Seepage Slope Content of large stones
Fairpoint	Very limited Restricted permeability Slope Content of large stones	Very limited Slope Content of large stones
Kaymine	Very limited Content of large stones Slope Seepage	Very limited Slope Content of large stones Seepage
FiF:		
Fiveblock	Very limited Slope Content of large stones Seepage	Very limited Slope Seepage Content of large stones
Fairpoint	Very limited Slope Restricted permeability Content of large stones	Very limited Slope Content of large stones
Kaymine	Very limited Slope Content of large stones Seepage	Very limited Slope Content of large stones Seepage
Gr:		
Grigsby	Very limited Flooding Seepage Depth to saturated zone	Very limited Flooding Seepage Depth to saturated zone
HaC:		
Hayter	Very limited Seepage Flooding Slope	Very limited Seepage Slope Flooding
Grigsby	Very limited Flooding Seepage Depth to saturated zone	Very limited Flooding Seepage Depth to saturated zone

Table 11.—Sanitary Facilities, Part I—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons
	Rating class and limiting features	Rating class and limiting features
HnF:		
Hazleton	Very limited Slope Seepage Content of large stones	Very limited Slope Seepage Content of large stones
Shelocta	Very limited Slope Seepage Depth to bedrock Restricted permeability	Very limited Slope Seepage Depth to soft bedrock
Fedscreek	Very limited Slope Seepage	Very limited Slope Seepage Content of large stones
Ho:		
Holly	Very limited Flooding Depth to saturated zone Seepage	Very limited Flooding Depth to saturated zone Seepage
MaF:		
Marrowbone	Very limited Depth to bedrock Slope Seepage	Very limited Depth to hard bedrock Slope Seepage
Blairton	Very limited Depth to bedrock Depth to saturated zone Slope Restricted permeability	Very limited Depth to soft bedrock Slope Depth to saturated zone Seepage
Dekalb	Very limited Depth to bedrock Slope Seepage Content of large stones	Very limited Depth to hard bedrock Slope Seepage Content of large stones
NeD:		
Nelse	Very limited Flooding Slope Seepage Depth to saturated zone	Very limited Flooding Seepage Slope

Table 11.—Sanitary Facilities, Part I—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons
	Rating class and limiting features	Rating class and limiting features
Or:		
Orrville	Very limited Flooding Depth to saturated zone Seepage Restricted permeability	Very limited Flooding Depth to saturated zone Seepage
RaF:		
Rayne	Very limited Slope Restricted permeability Depth to bedrock	Very limited Slope Depth to soft bedrock
Marrowbone	Very limited Depth to bedrock Slope Seepage	Very limited Depth to hard bedrock Slope Seepage
Dekalb	Very limited Depth to bedrock Slope Seepage Content of large stones	Very limited Depth to hard bedrock Slope Seepage Content of large stones
RoF:		
Rigley	Very limited Slope Seepage	Very limited Slope Seepage
Rock outcrop	Not rated	Not rated
SeE:		
Shelocta	Very limited Slope Seepage Depth to bedrock Restricted permeability	Very limited Slope Seepage Depth to soft bedrock
SgC:		
Shelocta	Very limited Seepage Depth to bedrock Restricted permeability Slope	Very limited Seepage Slope Depth to soft bedrock
Grigsby	Very limited Flooding Seepage Depth to saturated zone	Very limited Flooding Seepage Depth to saturated zone

Table 11.—Sanitary Facilities, Part I—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons
	Rating class and limiting features	Rating class and limiting features
SgC:		
Orrville	Very limited Flooding Depth to saturated zone Seepage Restricted permeability	Very limited Flooding Depth to saturated zone Seepage
ShF:		
Shelocta	Very limited Slope Seepage Depth to bedrock Restricted permeability	Very limited Slope Seepage Depth to soft bedrock
Hazleton	Very limited Slope Seepage Content of large stones	Very limited Slope Seepage Content of large stones
Fedscreek	Very limited Slope Seepage	Very limited Slope Seepage Content of large stones
UdC, UdF:		
Udorthents-Urban land	Not rated	Not rated
UpC:		
Upshur	Very limited Restricted permeability Depth to bedrock Slope	Very limited Slope Depth to soft bedrock
Rarden	Very limited Restricted permeability Depth to bedrock Depth to saturated zone Slope	Very limited Depth to soft bedrock Depth to saturated zone Slope
UpD, UpF:		
Upshur	Very limited Restricted permeability Slope Depth to bedrock	Very limited Slope Depth to soft bedrock
Rarden	Very limited Restricted permeability Depth to bedrock Depth to saturated zone Slope	Very limited Depth to soft bedrock Slope Depth to saturated zone

Table 11.—Sanitary Facilities, Part I—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons
	Rating class and limiting features	Rating class and limiting features
VaF, VaF2:		
Vandalia	Very limited Slope Restricted permeability Depth to saturated zone	Very limited Slope
Beech	Very limited Depth to saturated zone Slope Restricted permeability	Very limited Slope Depth to saturated zone Seepage
W:		
Water	Not rated	Not rated

Table 11.—Sanitary Facilities, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
AaB:			
Allegheny	Very limited Seepage	Not limited	Not limited
AaC:			
Allegheny	Very limited Seepage Slope	Somewhat limited Slope	Somewhat limited Slope
AbB:			
Allegheny	Very limited Seepage Flooding	Somewhat limited Flooding	Not limited
AbC:			
Allegheny	Very limited Seepage Flooding Slope	Somewhat limited Flooding Slope	Somewhat limited Slope
AeB:			
Allegheny	Very limited Flooding Seepage	Very limited Flooding	Not limited
BlC:			
Blairton	Very limited Depth to saturated zone Depth to bedrock Slope	Very limited Depth to saturated zone Depth to bedrock Slope	Very limited Depth to bedrock Depth to saturated zone Slope
Cruze	Very limited Depth to saturated zone Depth to bedrock Too clayey Slope Content of large stones	Very limited Depth to saturated zone Depth to bedrock Slope	Very limited Hard to compact Depth to saturated zone Depth to bedrock Too clayey Slope
Marrowbone	Very limited Depth to bedrock Seepage Slope	Very limited Depth to bedrock Seepage Slope	Very limited Depth to bedrock Seepage Slope
BlD:			
Blairton	Very limited Depth to saturated zone Depth to bedrock Slope	Very limited Depth to saturated zone Depth to bedrock Slope	Very limited Depth to bedrock Slope Depth to saturated zone

Table 11.—Sanitary Facilities, Part II—Continued

Map symbol and soil name	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
BlD:			
Cruze	Very limited Depth to saturated zone Depth to bedrock Slope Too clayey Content of large stones	Very limited Depth to saturated zone Slope Depth to bedrock	Very limited Hard to compact Slope Depth to saturated zone Depth to bedrock Too clayey
Marrowbone	Very limited Depth to bedrock Slope Seepage	Very limited Depth to bedrock Slope Seepage	Very limited Depth to bedrock Slope Seepage
Ch:			
Chagrin	Very limited Flooding Depth to saturated zone	Very limited Flooding Depth to saturated zone	Not limited
ClF:			
Cloverlick	Very limited Slope Seepage Content of large stones	Very limited Slope Seepage	Very limited Slope Content of large stones Seepage
Hazleton	Very limited Slope Seepage Content of large stones	Very limited Slope Seepage	Very limited Slope Seepage Content of large stones
Shelocta	Very limited Slope Depth to bedrock Seepage	Very limited Slope Seepage Depth to bedrock	Very limited Slope Depth to bedrock Gravel content
CmB, CmC:			
Cotaco	Very limited Depth to saturated zone	Very limited Depth to saturated zone	Somewhat limited Depth to saturated zone
CoB, CoC:			
Cotaco	Very limited Depth to saturated zone Flooding	Very limited Depth to saturated zone Flooding	Somewhat limited Depth to saturated zone
CtB:			
Cotaco	Very limited Flooding Depth to saturated zone	Very limited Flooding Depth to saturated zone	Somewhat limited Depth to saturated zone
DAM:			
Dams, large	Not rated	Not rated	Not rated
Dm:			
Dumps, mine; tailings; and tipples	Not rated	Not rated	Not rated

Table 11.—Sanitary Facilities, Part II—Continued

Map symbol and soil name	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
FiB:			
Fiveblock	Very limited Content of large stones Seepage	Very limited Seepage	Very limited Content of large stones Seepage
Fairpoint	Very limited Content of large stones	Not limited	Very limited Content of large stones
Kaymine	Very limited Content of large stones Seepage	Very limited Seepage	Very limited Content of large stones Seepage
FiD:			
Fiveblock	Very limited Content of large stones Slope Seepage	Very limited Slope Seepage	Very limited Content of large stones Slope Seepage
Fairpoint	Very limited Slope Content of large stones	Very limited Slope	Very limited Slope Content of large stones
Kaymine	Very limited Content of large stones Slope Seepage	Very limited Slope Seepage	Very limited Content of large stones Slope Seepage
FiF:			
Fiveblock	Very limited Slope Content of large stones Seepage	Very limited Slope Seepage	Very limited Slope Content of large stones Seepage
Fairpoint	Very limited Slope Content of large stones	Very limited Slope	Very limited Slope Content of large stones
Kaymine	Very limited Slope Content of large stones Seepage	Very limited Slope Seepage	Very limited Slope Content of large stones Seepage
Gr:			
Grigsby	Very limited Flooding Depth to saturated zone Seepage	Very limited Flooding Depth to saturated zone Seepage	Somewhat limited Seepage

Table 11.—Sanitary Facilities, Part II—Continued

Map symbol and soil name	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
HaC:			
Hayter	Very limited Seepage Flooding Slope	Very limited Seepage Flooding Slope	Somewhat limited Seepage Slope
Grigsby	Very limited Flooding Depth to saturated zone Seepage	Very limited Flooding Depth to saturated zone Seepage	Somewhat limited Seepage
HnF:			
Hazleton	Very limited Slope Seepage Content of large stones	Very limited Slope Seepage	Very limited Slope Seepage Content of large stones
Shelocta	Very limited Slope Depth to bedrock Seepage	Very limited Slope Seepage Depth to bedrock	Very limited Slope Depth to bedrock Gravel content
Fedscreek	Very limited Slope Seepage	Very limited Slope Seepage	Very limited Slope Seepage
Ho:			
Holly	Very limited Flooding Depth to saturated zone Seepage	Very limited Flooding Depth to saturated zone Seepage	Very limited Depth to saturated zone Seepage
MaF:			
Marrowbone	Very limited Slope Depth to bedrock Seepage	Very limited Slope Depth to bedrock Seepage	Very limited Depth to bedrock Slope Seepage
Blairton	Very limited Depth to saturated zone Slope Depth to bedrock	Very limited Slope Depth to saturated zone Depth to bedrock	Very limited Depth to bedrock Slope Depth to saturated zone
Dekalb	Very limited Slope Depth to bedrock Seepage Content of large stones	Very limited Slope Seepage Depth to bedrock	Very limited Depth to bedrock Slope Seepage Content of large stones
NeD:			
Nelse	Very limited Flooding Depth to saturated zone Slope Seepage	Very limited Flooding Depth to saturated zone Slope Seepage	Very limited Slope Seepage

Table 11.—Sanitary Facilities, Part II—Continued

Map symbol and soil name	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
Or:			
Orrville	Very limited Flooding Depth to saturated zone Seepage Too clayey	Very limited Flooding Depth to saturated zone Seepage	Very limited Depth to saturated zone Too clayey Seepage
RaF:			
Rayne	Very limited Slope Depth to bedrock Too clayey	Very limited Slope Depth to bedrock	Very limited Slope Depth to bedrock Too clayey
Marrowbone	Very limited Slope Depth to bedrock Seepage	Very limited Slope Depth to bedrock Seepage	Very limited Depth to bedrock Slope Seepage
Dekalb	Very limited Slope Depth to bedrock Seepage Content of large stones	Very limited Slope Seepage Depth to bedrock	Very limited Depth to bedrock Slope Seepage Content of large stones
RoF:			
Rigley	Very limited Slope Seepage	Very limited Slope Seepage	Very limited Slope Seepage
Rock outcrop	Not rated	Not rated	Not rated
SeE:			
Shelocta	Very limited Depth to bedrock Slope Seepage	Very limited Slope Seepage Depth to bedrock	Very limited Slope Depth to bedrock Gravel content
SgC:			
Shelocta	Very limited Depth to bedrock Seepage Slope	Very limited Seepage Depth to bedrock Slope	Somewhat limited Depth to bedrock Slope Gravel content
Grigsby	Very limited Flooding Depth to saturated zone Seepage	Very limited Flooding Depth to saturated zone Seepage	Somewhat limited Seepage
Orrville	Very limited Flooding Depth to saturated zone Seepage Too clayey	Very limited Flooding Depth to saturated zone Seepage	Very limited Depth to saturated zone Too clayey Seepage

Table 11.—Sanitary Facilities, Part II—Continued

Map symbol and soil name	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
ShF:			
Shelocta	Very limited Slope Depth to bedrock Seepage	Very limited Slope Seepage Depth to bedrock	Very limited Slope Depth to bedrock Gravel content
Hazleton	Very limited Slope Seepage Content of large stones	Very limited Slope Seepage	Very limited Slope Seepage Content of large stones
Fedscreek	Very limited Slope Seepage	Very limited Slope Seepage	Very limited Slope Seepage
UdC, UdF:			
Udorthents-Urban land	Not rated	Not rated	Not rated
UpC:			
Upshur	Very limited Depth to bedrock Too clayey Slope	Somewhat limited Depth to bedrock Slope	Very limited Too clayey Hard to compact Depth to bedrock Slope
Rarden	Very limited Depth to saturated zone Depth to bedrock Too clayey Slope	Very limited Depth to saturated zone Depth to bedrock Slope	Very limited Depth to bedrock Too clayey Hard to compact Depth to saturated zone Slope
UpD:			
Upshur	Very limited Depth to bedrock Too clayey Slope	Very limited Slope Depth to bedrock	Very limited Too clayey Hard to compact Slope Depth to bedrock
Rarden	Very limited Depth to saturated zone Depth to bedrock Too clayey Slope	Very limited Depth to saturated zone Depth to bedrock Slope	Very limited Depth to bedrock Too clayey Hard to compact Slope Depth to saturated zone
UpF:			
Upshur	Very limited Slope Depth to bedrock Too clayey	Very limited Slope Depth to bedrock	Very limited Slope Too clayey Hard to compact Depth to bedrock

Table 11.—Sanitary Facilities, Part II—Continued

Map symbol and soil name	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
UpF:			
Rarden	Very limited Depth to saturated zone Slope Depth to bedrock Too clayey	Very limited Slope Depth to saturated zone Depth to bedrock	Very limited Depth to bedrock Slope Too clayey Hard to compact Depth to saturated zone
VaF, VaF2:			
Vandalia	Very limited Depth to saturated zone Slope Too clayey	Very limited Slope Depth to saturated zone	Very limited Slope Too clayey
Beech	Very limited Depth to saturated zone Slope Too clayey	Very limited Slope Depth to saturated zone	Very limited Slope Depth to saturated zone Too clayey
W:			
Water	Not rated	Not rated	Not rated

Table 12.—Construction Materials, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Potential source of gravel	Potential source of sand
AaB, AaC, AbB, AbC, AeB:		
Allegheny	Poor	Fair
BlC, BlD:		
Blairton	Poor	Poor
Cruze	Poor	Poor
Marrowbone	Poor	Fair
Ch:		
Chagrin	Poor	Poor
ClF:		
Cloverlick	Poor	Poor
Hazleton	Poor	Poor
Shelocta	Poor	Poor
CmB, CmC, CoB, CoC, CtB:		
Cotaco	Poor	Poor
DAM:		
Dams, large	Not rated	Not rated
Dm:		
Dumps, mine; tailings; and tipples	Not rated	Not rated
FiB, FiD, FiF:		
Fiveblock	Poor	Poor
Fairpoint	Poor	Poor
Kaymine	Poor	Poor
Gr:		
Grigsby	Poor	Poor
HaC:		
Hayter	Poor	Poor
Grigsby	Poor	Poor
HnF:		
Hazleton	Poor	Poor
Shelocta	Poor	Poor
Fedscreek	Poor	Fair
Ho:		
Holly	Poor	Poor

Table 12.—Construction Materials, Part I—Continued

Map symbol and soil name	Potential source of gravel	Potential source of sand
MaF:		
Marrowbone	Poor	Fair
Blairton	Poor	Poor
Dekalb	Poor	Poor
NeD:		
Nelse	Poor	Fair
Or:		
Orrville	Poor	Poor
RaF:		
Rayne	Poor	Poor
Marrowbone	Poor	Fair
Dekalb	Poor	Poor
RoF:		
Rigley	Poor	Fair
Rock outcrop	Not rated	Not rated
SeE:		
Shelocta	Poor	Poor
SgC:		
Shelocta	Poor	Poor
Grigsby	Poor	Poor
Orrville	Poor	Poor
ShF:		
Shelocta	Poor	Poor
Hazleton	Poor	Poor
Fedscreek	Poor	Fair
UdC, UdF:		
Udorthents-Urban land	Not rated	Not rated
UpC, UpD, UpF:		
Upshur	Poor	Poor
Rarden	Poor	Poor
VaF, VaF2:		
Vandalia	Poor	Poor
Beech	Poor	Poor
W:		
Water	Not rated	Not rated

Table 12.—Construction Materials, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Potential source of reclamation material	Potential source of roadfill	Potential source of topsoil
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
AaB:			
Allegheny	Fair Too acid Low content of organic matter	Good	Fair Too acid
AaC:			
Allegheny	Fair Too acid Low content of organic matter	Good	Fair Too acid Slope
AbB:			
Allegheny	Fair Too acid Low content of organic matter	Good	Fair Too acid
AbC:			
Allegheny	Fair Too acid Low content of organic matter	Good	Fair Too acid Slope
AeB:			
Allegheny	Fair Too acid Low content of organic matter	Good	Fair Too acid
BlC:			
Blairton	Fair Low content of organic matter Droughty Too acid Water erosion Depth to bedrock	Poor Depth to bedrock Depth to saturated zone Cobble content	Fair Depth to saturated zone Too acid Rock fragments Slope Depth to bedrock
Cruze	Fair Low content of organic matter Too acid Too clayey Water erosion Cobble content	Poor Low strength Shrink-swell Depth to bedrock Cobble content Depth to saturated zone	Poor Hard to reclaim, rock fragments Rock fragments Too clayey Too acid Depth to saturated zone Slope
Marrowbone	Fair Low content of organic matter Droughty Too acid Depth to bedrock	Poor Depth to bedrock Cobble content	Poor Rock fragments Too acid Depth to bedrock Slope

Table 12.—Construction Materials, Part II—Continued

Map symbol and soil name	Potential source of reclamation material	Potential source of roadfill	Potential source of topsoil
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
BlD:			
Blairton	Fair Low content of organic matter Droughty Too acid Water erosion Depth to bedrock	Poor Depth to bedrock Depth to saturated zone Slope Cobble content	Poor Slope Depth to saturated zone Too acid Rock fragments Depth to bedrock
Cruze	Fair Low content of organic matter Too acid Too clayey Water erosion Cobble content	Poor Low strength Shrink-swell Depth to bedrock Cobble content Slope Depth to saturated zone	Poor Slope Hard to reclaim, rock fragments Rock fragments Too clayey Too acid Depth to saturated zone
Marrowbone	Fair Low content of organic matter Droughty Too acid Depth to bedrock	Poor Depth to bedrock Slope Cobble content	Poor Slope Rock fragments Too acid Depth to bedrock
Ch:			
Chagrin	Fair Low content of organic matter	Good	Fair Rock fragments
ClF:			
Cloverlick	Poor Stone content Too acid Low content of organic matter Cobble content	Poor Cobble content Stone content Slope	Poor Rock fragments Slope Hard to reclaim, rock fragments Too acid
Hazleton	Poor Stone content Low content of organic matter Cobble content Too acid	Poor Cobble content Stone content Slope	Poor Slope Rock fragments Hard to reclaim, rock fragments Too acid
Shelocta	Fair Too acid Low content of organic matter	Poor Slope Depth to bedrock	Poor Slope Hard to reclaim, rock fragments Rock fragments Too acid
CmB, CmC, CoB, CoC, CtB:			
Cotaco	Fair Too acid Low content of organic matter Water erosion	Fair Depth to saturated zone	Fair Depth to saturated zone Too acid

Table 12.—Construction Materials, Part II—Continued

Map symbol and soil name	Potential source of reclamation material	Potential source of roadfill	Potential source of topsoil
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
DAM:			
Dams, large	Not rated	Not rated	Not rated
Dm:			
Dumps, mine; tailings; and tipples	Not rated	Not rated	Not rated
FiB:			
Fiveblock	Poor Stone content Low content of organic matter Cobble content	Poor Cobble content Stone content	Poor Rock fragments Hard to reclaim, rock fragments
Fairpoint	Poor Stone content Low content of organic matter Cobble content	Poor Stone content Cobble content Shrink-swell	Poor Hard to reclaim, rock fragments Rock fragments
Kaymine	Poor Stone content Low content of organic matter Cobble content	Poor Stone content Cobble content	Poor Rock fragments Hard to reclaim, rock fragments
FiD:			
Fiveblock	Poor Stone content Low content of organic matter Cobble content	Poor Stone content Cobble content Slope	Poor Slope Rock fragments Hard to reclaim, rock fragments
Fairpoint	Poor Stone content Low content of organic matter Cobble content	Poor Stone content Cobble content Slope Shrink-swell	Poor Slope Hard to reclaim, rock fragments Rock fragments
Kaymine	Poor Stone content Low content of organic matter Cobble content	Poor Stone content Cobble content Slope	Poor Hard to reclaim, rock fragments Rock fragments Slope
FiF:			
Fiveblock	Poor Stone content Low content of organic matter Cobble content	Poor Slope Cobble content Stone content	Poor Slope Hard to reclaim, rock fragments Rock fragments
Fairpoint	Poor Stone content Low content of organic matter Cobble content	Poor Stone content Slope Cobble content Shrink-swell	Poor Hard to reclaim, rock fragments Rock fragments Slope
Kaymine	Poor Stone content Low content of organic matter Cobble content	Poor Cobble content Stone content Slope	Poor Hard to reclaim, rock fragments Rock fragments Slope

Table 12.—Construction Materials, Part II—Continued

Map symbol and soil name	Potential source of reclamation material	Potential source of roadfill	Potential source of topsoil
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
Gr:			
Grigsby	Fair Low content of organic matter	Good	Good
HaC:			
Hayter	Fair Low content of organic matter Too acid	Fair Shrink-swell	Fair Rock fragments Hard to reclaim, rock fragments Slope
Grigsby	Fair Low content of organic matter	Good	Good
HnF:			
Hazleton	Poor Stone content Low content of organic matter Cobble content Too acid	Poor Cobble content Slope Stone content	Poor Slope Rock fragments Hard to reclaim, rock fragments Too acid
Shelocta	Fair Too acid Low content of organic matter	Poor Slope Depth to bedrock	Poor Hard to reclaim, rock fragments Slope Rock fragments Too acid
Fedscreek	Fair Low content of organic matter Too acid	Poor Slope Cobble content	Poor Rock fragments Slope Hard to reclaim, rock fragments Too acid
Ho:			
Holly	Fair Too acid	Poor Depth to saturated zone	Poor Depth to saturated zone Rock fragments
MaF:			
Marrowbone	Fair Low content of organic matter Droughty Too acid Depth to bedrock	Poor Depth to bedrock Slope Cobble content	Poor Slope Rock fragments Too acid Depth to bedrock
Blairton	Fair Droughty Low content of organic matter Too acid Water erosion Depth to bedrock	Poor Slope Depth to bedrock Depth to saturated zone Cobble content	Poor Slope Depth to saturated zone Too acid Rock fragments Depth to bedrock

Table 12.—Construction Materials, Part II—Continued

Map symbol and soil name	Potential source of reclamation material	Potential source of roadfill	Potential source of topsoil
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
MaF:			
Dekalb	Poor Stone content Droughty Depth to bedrock Low content of organic matter Cobble content Too acid	Poor Stone content Depth to bedrock Slope Cobble content	Poor Rock fragments Slope Depth to bedrock Too acid
NeD:			
Nelse	Fair Low content of organic matter	Good	Poor Slope
Or:			
Orrville	Fair Low content of organic matter Too acid Water erosion	Poor Depth to saturated zone	Poor Depth to saturated zone Rock fragments
RaF:			
Rayne	Fair Too acid Low content of organic matter	Poor Slope Low strength Depth to bedrock Shrink-swell	Poor Slope Hard to reclaim, rock fragments Too acid Rock fragments
Marrowbone	Fair Low content of organic matter Droughty Too acid Depth to bedrock	Poor Slope Depth to bedrock Cobble content	Poor Slope Rock fragments Too acid Depth to bedrock
Dekalb	Poor Stone content Droughty Depth to bedrock Low content of organic matter Cobble content Too acid	Poor Cobble content Stone content Slope Depth to bedrock	Poor Rock fragments Slope Depth to bedrock Too acid
RoF:			
Rigley	Fair Too acid Low content of organic matter	Poor Slope	Poor Slope Too acid Hard to reclaim, rock fragments
Rock outcrop	Not rated	Not rated	Not rated
SeE:			
Shelocta	Fair Too acid Low content of organic matter	Fair Slope Depth to bedrock	Poor Hard to reclaim, rock fragments Slope Rock fragments Too acid

Table 12.—Construction Materials, Part II—Continued

Map symbol and soil name	Potential source of reclamation material	Potential source of roadfill	Potential source of topsoil
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
SgC:			
Shelocta	Fair Low content of organic matter Too acid	Fair Depth to bedrock	Poor Hard to reclaim, rock fragments Rock fragments Too acid Slope
Grigsby	Fair Low content of organic matter	Good	Good
Orrville	Fair Low content of organic matter Too acid Water erosion	Poor Depth to saturated zone	Poor Depth to saturated zone Rock fragments
ShF:			
Shelocta	Fair Low content of organic matter Too acid	Poor Slope Depth to bedrock	Poor Slope Hard to reclaim, rock fragments Rock fragments Too acid
Hazleton	Poor Stone content Low content of organic matter Cobble content Too acid	Poor Slope Stone content Cobble content	Poor Slope Rock fragments Hard to reclaim, rock fragments Too acid
Fedscreek	Fair Low content of organic matter Too acid	Poor Slope Cobble content	Poor Rock fragments Slope Hard to reclaim, rock fragments Too acid
UdC, UdF:			
Udorthents-Urban land	Not rated	Not rated	Not rated
UpC:			
Upshur	Poor Too clayey Too acid Low content of organic matter Water erosion	Poor Low strength Shrink-swell Depth to bedrock	Poor Too clayey Hard to reclaim, rock fragments Rock fragments Slope
Rarden	Poor Too clayey Droughty Depth to bedrock Too acid Low content of organic matter Water erosion	Poor Depth to bedrock Low strength Shrink-swell Depth to saturated zone	Poor Too clayey Depth to bedrock Too acid Depth to saturated zone Rock fragments Slope

Table 12.—Construction Materials, Part II—Continued

Map symbol and soil name	Potential source of reclamation material	Potential source of roadfill	Potential source of topsoil
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
UpD:			
Upshur	Poor Too clayey Too acid Low content of organic matter Water erosion	Poor Low strength Shrink-swell Depth to bedrock Slope	Poor Too clayey Hard to reclaim, rock fragments Slope Rock fragments
Rarden	Poor Too clayey Droughty Depth to bedrock Too acid Low content of organic matter Water erosion	Poor Low strength Depth to bedrock Shrink-swell Depth to saturated zone Slope	Poor Slope Too clayey Depth to bedrock Too acid Depth to saturated zone Rock fragments
UpF:			
Upshur	Poor Too clayey Too acid Low content of organic matter Water erosion	Poor Low strength Slope Shrink-swell Depth to bedrock	Poor Slope Too clayey Hard to reclaim, rock fragments Rock fragments
Rarden	Poor Too clayey Droughty Depth to bedrock Too acid Low content of organic matter Water erosion	Poor Low strength Slope Depth to bedrock Shrink-swell Depth to saturated zone	Poor Slope Too clayey Depth to bedrock Too acid Depth to saturated zone Rock fragments
VaF:			
Vandalia	Poor Too clayey Too acid Low content of organic matter Water erosion	Poor Low strength Slope Shrink-swell	Poor Hard to reclaim, rock fragments Slope Too clayey Rock fragments Too acid
Beech	Fair Low content of organic matter Too acid	Poor Slope Depth to saturated zone Shrink-swell	Poor Slope Rock fragments Hard to reclaim, rock fragments Depth to saturated zone Too acid

Table 12.—Construction Materials, Part II—Continued

Map symbol and soil name	Potential source of reclamation material	Potential source of roadfill	Potential source of topsoil
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
VaF2:			
Vandalia	Poor Too clayey Too acid Low content of organic matter Water erosion	Poor Slope Low strength Shrink-swell	Poor Slope Too clayey Rock fragments Too acid
Beech	Fair Low content of organic matter Too acid	Poor Slope Depth to saturated zone Shrink-swell	Poor Slope Depth to saturated zone Too acid
W:			
Water	Not rated	Not rated	Not rated

Table 13.—Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
AaB:			
Allegheny	Very limited Seepage	Very limited Piping Seepage	Very limited No ground water
AaC:			
Allegheny	Very limited Seepage Slope	Very limited Piping Seepage	Very limited No ground water
AbB:			
Allegheny	Very limited Seepage	Very limited Piping Seepage	Very limited No ground water
AbC:			
Allegheny	Very limited Seepage Slope	Very limited Piping Seepage	Very limited No ground water
AeB:			
Allegheny	Very limited Seepage	Very limited Piping Seepage	Very limited No ground water
BlC:			
Blairton	Somewhat limited Seepage Depth to bedrock	Very limited Depth to saturated zone Thin layer Seepage	Somewhat limited Slow refill Cutbanks cave
Cruze	Somewhat limited Seepage Depth to bedrock	Somewhat limited Depth to saturated zone Thin layer Content of large stones	Somewhat limited Slow refill Cutbanks cave Depth to water Content of large stones
Marrowbone	Very limited Seepage Depth to bedrock	Somewhat limited Thin layer Seepage	Very limited No ground water
BlD:			
Blairton	Somewhat limited Seepage Slope Depth to bedrock	Very limited Depth to saturated zone Thin layer Seepage	Somewhat limited Slow refill Cutbanks cave
Cruze	Somewhat limited Slope Seepage Depth to bedrock	Somewhat limited Depth to saturated zone Thin layer Content of large stones	Somewhat limited Slow refill Cutbanks cave Depth to water Content of large stones

Table 13.—Water Management—Continued

Map symbol and soil name	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
BlD:			
Marrowbone	Very limited Seepage Depth to bedrock Slope	Somewhat limited Thin layer Seepage	Very limited No ground water
Ch:			
Chagrin	Somewhat limited Seepage	Very limited Piping	Very limited No ground water Slow refill
ClF:			
Cloverlick	Very limited Slope Seepage	Very limited Content of large stones Piping Seepage	Very limited No ground water
Hazleton	Very limited Seepage Slope	Very limited Content of large stones Seepage	Very limited No ground water
Shelocta	Very limited Slope Seepage Depth to bedrock	Very limited Piping Thin layer	Very limited No ground water
CmB, CmC, CoB, CoC, CtB:			
Cotaco	Somewhat limited Seepage	Very limited Piping Depth to saturated zone	Somewhat limited Slow refill Cutbanks cave Depth to water
DAM:			
Dams, large	Not rated	Not rated	Not rated
Dm:			
Dumps, mine; tailings; and tipples	Not rated	Not rated	Not rated
FiB:			
Fiveblock	Very limited Seepage	Very limited Content of large stones Seepage	Very limited No ground water
Fairpoint	Somewhat limited Seepage	Very limited Content of large stones	Very limited No ground water
Kaymine	Very limited Seepage	Very limited Content of large stones Seepage	Very limited No ground water
FiD:			
Fiveblock	Very limited Seepage Slope	Very limited Content of large stones Seepage	Very limited No ground water

Table 13.—Water Management—Continued

Map symbol and soil name	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
FiD:			
Fairpoint	Somewhat limited Slope Seepage	Very limited Content of large stones	Very limited No ground water
Kaymine	Very limited Seepage Slope	Very limited Content of large stones Seepage	Very limited No ground water
FiF:			
Fiveblock	Very limited Seepage Slope	Very limited Content of large stones Seepage	Very limited No ground water
Fairpoint	Very limited Slope Seepage	Very limited Content of large stones	Very limited No ground water
Kaymine	Very limited Slope Seepage	Very limited Content of large stones Seepage	Very limited No ground water
Gr:			
Grigsby	Very limited Seepage	Somewhat limited Seepage	Somewhat limited Depth to water Cutbanks cave
HaC:			
Hayter	Very limited Seepage	Not limited	Very limited No ground water
Grigsby	Very limited Seepage	Somewhat limited Seepage	Somewhat limited Depth to water Cutbanks cave
HnF:			
Hazleton	Very limited Seepage Slope	Very limited Content of large stones Seepage	Very limited No ground water
Shelocta	Very limited Slope Seepage Depth to bedrock	Very limited Piping Thin layer	Very limited No ground water
Fedscreek	Very limited Seepage Slope	Somewhat limited Seepage	Very limited No ground water
Ho:			
Holly	Very limited Seepage	Very limited Depth to saturated zone Piping	Somewhat limited Cutbanks cave

Table 13.—Water Management—Continued

Map symbol and soil name	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
MaF:			
Marrowbone	Very limited Seepage Slope Depth to bedrock	Somewhat limited Thin layer Seepage	Very limited No ground water
Blairton	Somewhat limited Seepage Slope Depth to bedrock	Very limited Depth to saturated zone Thin layer Seepage	Somewhat limited Slow refill Cutbanks cave
Dekalb	Very limited Seepage Depth to bedrock Slope	Very limited Content of large stones Thin layer Seepage	Very limited No ground water
NeD:			
Nelse	Very limited Seepage Slope	Somewhat limited Seepage	Very limited No ground water
Or:			
Orrville	Very limited Seepage	Very limited Depth to saturated zone Piping	Somewhat limited Cutbanks cave
RaF:			
Rayne	Somewhat limited Slope Seepage Depth to bedrock	Somewhat limited Piping Thin layer	Very limited No ground water
Marrowbone	Very limited Seepage Slope Depth to bedrock	Somewhat limited Thin layer Seepage	Very limited No ground water
Dekalb	Very limited Seepage Slope Depth to bedrock	Very limited Content of large stones Thin layer Seepage	Very limited No ground water
RoF:			
Rigley	Very limited Seepage Slope	Somewhat limited Seepage	Very limited No ground water
Rock outcrop	Not rated	Not rated	Not rated
SeE:			
Shelocta	Very limited Seepage Slope Depth to bedrock	Very limited Piping Thin layer	Very limited No ground water

Table 13.—Water Management—Continued

Map symbol and soil name	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
SgC:			
Shelocta	Very limited Seepage Depth to bedrock	Very limited Piping Thin layer	Very limited No ground water
Grigsby	Very limited Seepage	Somewhat limited Seepage	Somewhat limited Depth to water Cutbanks cave
Orrville	Very limited Seepage	Very limited Depth to saturated zone Piping	Somewhat limited Cutbanks cave
ShF:			
Shelocta	Very limited Seepage Slope Depth to bedrock	Very limited Piping Thin layer	Very limited No ground water
Hazleton	Very limited Seepage Slope	Very limited Content of large stones Seepage	Very limited No ground water
Fedscreek	Very limited Seepage Slope	Somewhat limited Seepage	Very limited No ground water
UdC, UdF:			
Udorthents-Urban land	Not rated	Not rated	Not rated
UpC:			
Upshur	Somewhat limited Depth to bedrock	Somewhat limited Hard to pack Thin layer	Very limited No ground water
Rarden	Somewhat limited Depth to bedrock	Somewhat limited Depth to saturated zone Thin layer Hard to pack	Somewhat limited Cutbanks cave Depth to water
UpD:			
Upshur	Somewhat limited Slope Depth to bedrock	Somewhat limited Hard to pack Thin layer	Very limited No ground water
Rarden	Somewhat limited Depth to bedrock Slope	Somewhat limited Depth to saturated zone Thin layer Hard to pack	Somewhat limited Cutbanks cave Depth to water

Table 13.—Water Management—Continued

Map symbol and soil name	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds
	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
UpF:			
Upshur	Somewhat limited Slope Depth to bedrock	Somewhat limited Hard to pack Thin layer	Very limited No ground water
Rarden	Somewhat limited Slope Depth to bedrock	Somewhat limited Depth to saturated zone Thin layer Hard to pack	Somewhat limited Cutbanks cave Depth to water
VaF:			
Vandalia	Somewhat limited Slope Seepage	Somewhat limited Piping	Very limited No ground water Slow refill
Beech	Somewhat limited Seepage Slope	Somewhat limited Depth to saturated zone	Somewhat limited Slow refill Cutbanks cave Depth to water
VaF2:			
Vandalia	Somewhat limited Slope Seepage	Somewhat limited Piping	Very limited No ground water Slow refill
Beech	Somewhat limited Seepage Slope	Very limited Piping Depth to saturated zone	Somewhat limited Slow refill Cutbanks cave Depth to water
W:			
Water	Not rated	Not rated	Not rated

Table 14.—Engineering Index Properties

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200
	In				Pct	Pct				
AaB, AaC, AbB, AbC, AeB:										
Allegheny------	0-8	Loam	CL, ML	A-4	0	0	90-100	80-100	65-100	55-9
	8-52	Clay loam, loam, silt loam, sandy clay loam	CL, ML, SC, SM	A-4, A-6	0	0	90-100	80-100	65-95	35-8
	52-89	Clay loam, sandy loam, gravelly sandy loam	CL, GC, ML, SM	A-1, A-2, A-4, A-6	0	0-5	65-100	55-100	35-95	20-7
BlC:										
Blairton--------	0-5	Silt loam	CL, CL-ML, ML	A-4	0	0-16	80-100	75-100	65-90	50-8
	5-23	Silt loam, channery silty clay loam, very channery loam	ML, SC, CL, GC, GM	A-2, A-4, A-6, A-7	0	0-41	50-90	35-90	30-85	25-7
	23-37	Very channery loam, channery loam, very channery silt loam	GM, CL, SM, ML	A-2, A-4, A-6, A-1	0	0-63	15-65	15-65	15-65	10-6
	37-47	Weathered bedrock			---	---	---	---	---	---
Cruze-----------	0-2	Silt loam	CL-ML, ML, CL	A-4, A-6	0	0-5	85-100	75-100	70-95	60-8
	2-18	Silt loam, silty clay loam, silty clay, very channery silty clay loam	SC, GC, CL	A-6, A-7	0	0-10	70-100	55-100	55-95	45-8
	18-48	Silty clay, silty clay loam, very channery silty clay loam, extremely channery silty clay loam	MH, CH, CL	A-7	0	0-55	70-100	55-100	55-95	50-9
	48-58	Weathered bedrock			---	---	---	---	---	---

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200
	In				Pct	Pct				
BlC:										
Marrowbone------	0-4	Sandy loam	GM, SC, SC-SM, SM	A-4	0	0-5	70-95	65-90	55-85	35-4
	4-35	Channery loam, loam, fine sandy loam, channery sandy loam	SM, GC-GM, SC, SC-SM	A-2-4, A-4	0	0-41	50-95	50-90	40-85	25-4
	35-40	Weathered bedrock			---	---	---	---	---	---
	40-44	Unweathered bedrock			---	---	---	---	---	---
BlD:										
Blairton--------	0-5	Silt loam	CL, CL-ML, ML	A-4	0	0-16	80-100	75-100	65-90	50-8
	5-23	Silt loam, channery silty clay loam, very channery loam	ML, GM, GC, CL, SC	A-2, A-4, A-6, A-7	0	0-41	50-90	35-90	30-85	25-7
	23-37	Very channery loam, channery loam, very channery silt loam	GM, CL, SM, ML	A-1, A-2, A-4, A-6	0-1	0-63	15-65	15-65	15-65	10-6
	37-47	Weathered bedrock			---	---	---	---	---	---
Cruze-----------	0-2	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0-5	85-100	75-100	70-95	60-8
	2-18	Silt loam, silty clay loam, silty clay, very channery silty clay loam	GC, SC, CL	A-6, A-7	0	0-10	70-100	55-100	55-95	45-8
	18-48	Silty clay, silty clay loam, very channery silty clay loam, extremely channery silty clay loam	CH, CL, MH	A-7	0	0-55	70-100	55-100	55-95	50-9
	48-58	Weathered bedrock			---	---	---	---	---	---

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200
	In				Pct	Pct				
BlD:										
Marrowbone------	0-4	Sandy loam	GM, SC, SC-SM, SM	A-4	0	0-5	70-95	65-90	55-85	35-4
	4-35	Channery loam, loam, fine sandy loam, channery sandy loam	GC-GM, SC, SM, SC-SM	A-2-4, A-4	0	0-41	50-95	50-90	40-85	25-4
	35-40	Weathered bedrock			---	---	---	---	---	---
	40-44	Unweathered bedrock			---	---	---	---	---	---
Ch:										
Chagrin---------	0-10	Loam	CL-ML, ML, CL	A-4	0	0	95-100	85-100	80-100	70-9
	10-82	Silt loam, loam, sandy loam	ML, SM	A-2, A-4, A-6	0	0	90-100	75-100	55-90	30-8
	82-90	Stratified gravelly fine sand to silt loam, silt loam	ML, SM, SP-SM	A-2, A-4	0	0	75-100	65-100	40-85	10-8

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200
	In				Pct	Pct				
ClF:										
Cloverlick------	0-9	Very channery loam	CL, CL-ML, SC, SC-SM	A-4, A-6, A-7	0	5-55	50-90	40-80	40-80	35-7
	9-18	Channery loam, channery silt loam, extremely channery loam, very channery loam	CL, SM, CL-ML, ML, SC-SM	A-4, A-6	0	5-30	50-90	40-85	40-85	35-7
	18-48	Very channery loam, very channery silt loam, very flaggy loam, extremely channery loam	ML, GC, CL-ML, SC-SM, SM	A-2, A-4, A-6	5-45	5-45	50-80	40-75	35-70	30-7
	48-86	Very flaggy loam, extremely flaggy loam, extremely flaggy silt loam, extremely channery sandy loam	GC, SM, GC-GM, GM, SC-SM	A-2, A-4, A-6	5-50	5-50	40-90	40-80	30-70	30-7
Hazleton--------	0-3	Very channery sandy loam	SM, ML, GM, GC-GM	A-2, A-4	0	5-38	60-85	60-80	60-75	35-5
	3-80	Channery loam, very channery sandy loam, very channery loamy sand, extremely channery sandy loam	GC, SC, GM, SM	A-1, A-2, A-4	5-45	5-45	55-80	35-75	25-65	15-5

Table 14.–Engineering Index Properties–Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200
	In				Pct	Pct				
ClF:										
Shelocta--------	0-3	Silt loam	CL-ML, ML	A-4	0	0-5	80-95	75-95	60-95	55-9
	3-39	Silty clay loam, silt loam, channery silt loam	SC, GC, CL-ML, CL	A-4, A-6	0	3-24	55-95	50-95	45-95	40-9
	39-51	Channery silt loam, channery silty clay loam, very channery silt loam, very channery clay loam	GM, GC, CL, ML	A-1-b, A-2, A-4, A-6	0	3-44	40-85	35-70	25-70	20-6
	51-61	Weathered bedrock			---	---	---	---	---	---
CmB, CmC, CoB, CoC, CtB:										
Cotaco---------	0-9	Silt loam	SM, CL-ML, ML, SC-SM	A-4	0	0-5	80-100	75-95	55-85	35-8
	9-55	Gravelly sandy clay loam, clay loam, loam, silt loam	SM, SC, CL, GC	A-1-b, A-2, A-4, A-6	0	0-9	60-100	50-95	40-90	20-8
	55-85	Gravelly silt loam, clay loam, loam, silt loam	CL, GC, SC, SM	A-1-b, A-2, A-4, A-6	0	0-9	60-100	50-95	40-90	20-8
DAM. Dams, large										
Dm. Dumps, mine; tailings; and tipples										

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200
	In				Pct	Pct				
FiB, FiD, FiF:										
Fiveblock-------	0-4	Channery sandy loam	GC-GM, GM, SC-SM, SM	A-1, A-2	0	8-30	55-70	50-65	35-50	10-2
	4-80	Extremely channery sandy loam, very flaggy sandy loam, very channery sandy loam, extremely flaggy sandy loam	SM, SC-SM, GM, GC-GM	A-1, A-2	15-65	15-65	45-65	25-50	15-35	10-2
Fairpoint-------	0-7	Channery silt loam	CL-ML, GC-GM, GM, ML	A-4, A-6	0	0-13	65-90	55-80	50-80	35-7
	7-80	Channery clay loam, very channery silty clay loam, very flaggy silt loam, extremely flaggy silt loam	CL, CL-ML, GC, SC	A-2, A-4, A-6, A-7	13-38	13-38	55-75	25-65	20-65	15-6
Kaymine---------	0-6	Very channery loam	GC	A-2, A-4, A-6	0	8-44	45-60	40-55	30-50	20-4
	6-80	Extremely channery loam, very channery loam, very flaggy loam, extremely flaggy loam	GC	A-2, A-4, A-6	15-53	15-53	30-55	25-50	20-45	15-4
Gr:										
Grigsby---------	0-11	Fine sandy loam	SC-SM, SM	A-2, A-4	0	0-5	80-100	80-100	50-95	25-5
	11-64	Loam, fine sandy loam, silt loam, sandy loam	CL, ML, SC, SM	A-2, A-4	0	0-5	80-100	80-100	70-100	30-7
	64-80	Fine sandy loam, loam, gravelly sandy loam, stratified sandy loam to loam	GC-GM, ML, SC-SM, SM	A-1, A-2, A-4	0	0-30	40-100	30-100	25-100	20-7

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200
	In				Pct	Pct				
HaC:										
Hayter----------	0-10	Loam	SM, SC, ML, CL	A-4, A-6	0	0-11	90-100	80-100	55-85	36-7
	10-70	Clay loam, sandy clay loam, channery clay loam, loam	CL, SC	A-2, A-6, A-7	0	0-24	85-100	80-100	60-95	30-7
	70-80	Channery loam, very channery loam, very channery fine sandy loam, very channery clay loam	CL, ML, SC, SM	A-2, A-4, A-6	0	20-60	75-100	55-95	45-90	30-6
Grigsby---------	0-11	Fine sandy loam	SC-SM, SM	A-2, A-4	0	0-5	80-100	80-100	50-95	25-5
	11-64	Loam, fine sandy loam, silt loam, sandy loam	CL, ML, SC, SM	A-2, A-4	0	0-5	80-100	80-100	70-100	30-7
	64-80	Fine sandy loam, loam, gravelly sandy loam, stratified sandy loam to loam	GC-GM, ML, SC-SM, SM	A-1, A-2, A-4	0	0-30	40-100	30-100	25-100	20-7
HnF:										
Hazleton--------	0-3	Very channery sandy loam	GC-GM, SM, ML, GM	A-2, A-4	0	5-38	60-85	60-80	60-75	35-5
	3-80	Channery loam, very channery sandy loam, very channery loamy sand, extremely channery sandy loam	SM, SC, GM, GC	A-1, A-2, A-4	5-45	5-45	55-80	35-75	25-65	15-5

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200
	In				Pct	Pct				
HnF:										
Shelocta--------	0-3	Silt loam	CL-ML, ML	A-4	0	0-5	80-95	75-95	60-95	55-9
	3-39	Silty clay loam, silt loam, channery silt loam	CL, SC, GC, CL-ML	A-4, A-6	0	3-24	55-95	50-95	45-95	40-9
	39-51	Channery silt loam, channery silty clay loam, very channery silt loam, very channery loam	CL, GC, GM, ML	A-1-b, A-2, A-4, A-6	0	3-44	40-85	35-70	25-70	20-6
	51-61	Weathered bedrock			---	---	---	---	---	---
Fedscreek-------	0-4	Fine sandy loam	SC-SM, SM, GM, GC-GM, GC	A-1-b, A-2, A-4	0	0-26	35-95	35-95	35-65	20-4
	4-74	Channery loam, channery sand, loam, channery sandy loam	GM, SC, SC-SM, SM	A-2-4, A-4	0	0-41	50-95	50-90	40-85	25-4
	74-82	Very channery loam, channery loam, channery sandy loam, very channery sandy loam	GC-GM, GM, SC, SC-SM	A-2, A-4	0	5-44	35-80	35-75	25-65	25-4
Ho:										
Holly-----------	0-9	Silt loam	ML	A-4	0	0	90-100	85-100	80-100	70-9
	9-20	Silt loam, loam, sandy loam	ML, SM	A-4, A-6	0	0	85-100	75-100	70-95	45-8
	20-61	Silt loam, loam, sandy loam	ML, SM	A-2, A-4	0	0	85-100	75-100	50-95	25-8
	61-80	Silt loam, gravelly loam, gravelly silt loam, sandy loam	ML, SM, SP-SM	A-1-b, A-2, A-4	0	0-5	70-100	65-100	40-90	10-7

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200
	In				Pct	Pct				
MaF:										
Marrowbone------	0-4	Sandy loam	GM, SC, SC-SM, SM	A-4	0	0-5	70-95	65-90	55-85	35-4
	4-35	Channery loam, loam, fine sandy loam, channery sandy loam	GC-GM, SC, SC-SM, SM	A-2-4, A-4	0	0-41	50-95	50-90	40-85	25-4
	35-40	Weathered bedrock			---	---	---	---	---	---
	40-44	Unweathered bedrock			---	---	---	---	---	---
Blairton--------	0-5	Silt loam	CL-ML, CL, ML	A-4	0	0-16	70-100	60-95	55-90	50-8
	5-23	Silt loam, channery silty clay loam, very channery loam	ML, GM, CL, SC	A-2, A-4, A-6, A-7	0	0-41	50-100	35-100	30-85	25-7
	23-37	Very channery loam, channery loam, very channery silt loam, channery silty clay loam	CL, GP-GM, GM, ML	A-1, A-2, A-4, A-6	0	0-63	15-65	15-65	15-65	10-6
	37-47	Weathered bedrock			---	---	---	---	---	---
Dekalb----------	0-4	Very channery sandy loam	CL-ML, GM, ML, SM	A-1, A-2, A-4	0	9-44	50-90	45-80	40-75	20-5
	4-24	Channery sandy loam, channery loam, very channery sandy loam, extremely channery sandy loam	SC-SM, GC-GM, GM, ML, SM	A-1, A-2, A-4	5-55	5-55	50-85	40-75	40-75	20-5
	24-28	Unweathered bedrock			---	---	---	---	---	---

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200
	In				Pct	Pct				
NeD:										
Nelse	0-12	Fine sandy loam	SC-SM, SM, CL-ML, ML	A-2-4, A-4	0	0-5	95-100	95-100	65-90	30-6
	12-44	Fine sandy loam, loam, loamy fine sand, stratified sand to fine sandy loam	SC-SM, SM	A-2-4, A-4, A-2	0	0-5	95-100	90-100	60-85	25-4
	44-80	Loamy fine sand, fine sandy loam, sandy loam, stratified sand to fine sandy loam	SM	A-2-4, A-2	0	0-5	95-100	90-100	60-85	15-3
Or:										
Orrville	0-10	Silt loam	CL, CL-ML, ML	A-4	0	0	100	90-100	85-100	60-8
	10-30	Silt loam, loam, silty clay loam	ML, CL, CL-ML	A-4, A-6	0	0-2	95-100	75-100	70-95	50-9
	30-80	Loam, sandy loam, clay loam, silt loam	SM, SC, ML, CL	A-1, A-2, A-4	0	0-5	95-100	65-100	40-85	15-7
RaF:										
Rayne	0-3	Loam	CL, ML	A-4	0	0-11	70-100	65-100	60-95	55-9
	3-37	Clay loam, silty clay loam, silt loam, channery silty clay loam	CL, ML	A-6, A-7	0	0-22	75-100	70-100	65-95	60-9
	37-49	Silt loam, channery silt loam, very channery silty clay loam, silty clay loam	GM, ML, SM	A-4, A-6, A-7	0	0-41	45-100	30-100	25-95	25-9
	49-59	Weathered bedrock			---	---	---	---	---	---

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200
	In				Pct	Pct				
RaF:										
Marrowbone------	0-4	Sandy loam	SC-SM, GC-GM, GM, SC, SM	A-1-b, A-2, A-4	0	0-5	35-95	30-90	25-65	20-4
	4-35	Channery loam, loam, fine sandy loam, channery sandy loam	GC-GM, SC, SC-SM, SM	A-1, A-2, A-4	0	0-41	55-95	55-90	40-80	20-4
	35-40	Weathered bedrock			0	0	---	---	---	---
	40-44	Unweathered bedrock			---	---	---	---	---	---
Dekalb----------	0-4	Very channery sandy loam	CL-ML, GM, ML, SM	A-1, A-2, A-4	0	9-44	50-90	45-80	40-75	20-5
	4-24	Channery sandy loam, channery loam, very channery sandy loam, extremely channery sandy loam	SC-SM, GC-GM, GM, ML, SM	A-1, A-2, A-4	5-55	5-55	50-85	40-75	40-75	20-5
	24-28	Unweathered bedrock			---	---	---	---	---	---
RoF:										
Rigley----------	0-6	Fine sandy loam	CL-ML, ML, SC-SM, SM	A-2, A-4	0	0-9	80-95	75-90	55-80	25-6
	6-53	Channery sandy loam, channery loam, sandy loam, loam	GC-GM, GM, ML, SM	A-1, A-2, A-4	0	0-9	65-100	60-95	40-75	20-6
	53-80	Channery sandy loam, channery loam, channery clay loam, sandy loam	GC, GM, SC, SM	A-1, A-2, A-4, A-6	0	0-16	55-100	45-95	30-60	15-5
Rock outcrop.										

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200
	In				Pct	Pct				
SeE:										
Shelocta--------	0-3	Silt loam	CL-ML, ML	A-4	0	0-5	80-95	75-95	60-95	55-9
	3-39	Silty clay loam, silt loam, channery silt loam	CL, CL-ML, GC, SC	A-4, A-6	0	5-24	55-95	50-95	45-95	40-9
	39-51	Channery silt loam, channery silty clay loam, very channery silt loam, very channery loam	GM, GC, CL, ML	A-1-b, A-2, A-4, A-6	0	3-44	40-85	35-70	25-70	20-6
	51-61	Weathered bedrock			---	---	---	---	---	---
SgC:										
Shelocta--------	0-3	Silt loam	CL-ML, ML	A-4	0	0-5	80-95	75-95	60-95	55-9
	3-39	Silty clay loam, silt loam, channery silt loam	SC, GC, CL-ML, CL	A-4, A-6	0	5-24	55-95	50-95	45-95	40-9
	39-51	Channery silt loam, channery silty clay loam, very channery silt loam, very channery loam	CL, GC, GM, ML	A-1-b, A-2, A-4, A-6	0	3-44	40-85	35-70	25-70	20-6
	51-61	Weathered bedrock			---	---	---	---	---	---
Grigsby---------	0-11	Fine sandy loam	SM, SC-SM	A-2, A-4	0	0-5	80-100	80-100	50-95	25-5
	11-64	Loam, fine sandy loam, silt loam, sandy loam	CL, ML, SC, SM	A-2, A-4	0	0-5	80-100	80-100	70-100	30-7
	64-80	Fine sandy loam, loam, gravelly sandy loam, stratified sandy loam to loam	SC-SM, GC-GM, ML, SM	A-2, A-4, A-1	0	0-30	40-100	30-100	25-100	20-7

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200
	In				Pct	Pct				
SgC:										
Orrville--------	0-10	Silt loam	CL, CL-ML, ML	A-4	0	0	100	90-100	85-100	60-8
	10-30	Silt loam, loam, silty clay loam	ML, CL, CL-ML	A-4, A-6	0	0	95-100	75-100	70-95	50-9
	30-80	Silt loam, loam, sandy loam, clay loam	SM, CL, ML, SC	A-1, A-2, A-4	0	0-5	95-100	65-100	40-85	15-7
ShF:										
Shelocta--------	0-3	Silt loam	CL-ML, ML	A-4	0	0-5	80-95	75-95	60-95	55-9
	3-39	Silty clay loam, silt loam, channery silt loam	CL, CL-ML, GC, SC	A-4, A-6	0	3-24	55-95	50-95	45-95	40-9
	39-51	Channery silt loam, channery silty clay loam, very channery silt loam, very channery loam	ML, GM, CL, GC	A-2, A-4, A-6, A-1-b	0	3-44	40-85	35-70	25-70	20-6
	51-61	Weathered bedrock			---	---	---	---	---	---
Hazleton--------	0-3	Very channery sandy loam	GC-GM, GM, ML, SM	A-2, A-4	0	5-38	60-85	60-80	60-75	35-5
	3-80	Channery loam, very channery sandy loam, very channery loamy sand, extremely channery sandy loam	SC, SM, GM, GC	A-1, A-2, A-4	5-45	5-45	55-80	35-75	25-65	15-5
Fedscreek-------	0-4	Fine sandy loam	GC-GM, SC-SM, GC, GM, SM	A-1-b, A-2, A-4	0	0-26	35-95	35-95	35-65	20-4
	4-74	Channery sandy loam, channery loam, channery sand, loam	SC, GM, SC-SM, SM	A-2-4, A-4	0	0-41	50-95	50-90	40-85	25-4
	74-82	Very channery loam, channery loam, channery sandy loam, very channery sandy loam	SC-SM, SC, GC-GM, GM	A-2, A-4	0	5-44	35-80	35-75	25-65	25-4

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200
	In				Pct	Pct				
UdC, UdF. Udorthents-Urban land										
UpC, UpD, UpF:										
Upshur----------	0-3	Silty clay loam	CL, ML	A-6, A-7	0	0	95-100	95-100	90-100	80-9
	3-42	Silty clay, clay	MH, CH, CL	A-7	0	0-55	95-100	95-100	90-100	85-1
	42-52	Extremely channery silty clay loam, silty clay, clay	ML, CH, CL, MH	A-6, A-7	0	30-90	80-100	65-100	60-100	55-9
	52-62	Weathered bedrock			---	---	---	---	---	---
Rarden----------	0-3	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	95-100	90-100	85-9
	3-26	Silty clay, clay, channery silty clay loam	MH, CH	A-7	0	0-9	85-100	70-100	65-100	60-1
	26-36	Weathered bedrock			---	---	---	---	---	---
VaF:										
Vandalia--------	0-4	Loam	CL, ML	A-4, A-6, A-7	0	0-9	65-95	60-90	55-75	55-6
	4-47	Silty clay loam, clay loam, silty clay, clay	CH, CL, MH, ML	A-6, A-7	0	0-5	70-100	70-95	65-90	60-8
	47-69	Silty clay, clay, silty clay loam, very channery silty clay loam	CH, CL, ML, MH	A-6, A-7	0	15-55	70-100	65-100	60-100	55-1
	69-79	Weathered bedrock			---	---	---	---	---	---

Table 14.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200
	In				Pct	Pct				
VaF:										
Beech----------	0-4	Silt loam	CL-ML, ML, CL	A-4	0	0-5	65-95	60-90	55-85	45-8
	4-36	Channery loam, channery clay loam, very channery loam, very channery clay loam	GC, CL, SC, ML	A-2, A-4, A-6	0	0-16	45-90	40-85	35-80	30-6
	36-80	Very channery loam, very channery silt loam, channery clay loam, extremely channery clay loam	SC, ML, CL, GC	A-2, A-4, A-6	0	0-21	40-85	35-80	30-75	25-6
VaF2:										
Vandalia--------	0-2	Silt loam	CL, ML	A-4, A-6, A-7	0	0-9	65-95	60-90	55-75	55-6
	2-54	Silty clay loam, clay loam, silty clay, clay	CH, CL, MH, ML	A-6, A-7	0	0-5	70-100	70-95	65-90	60-8
	54-64	Silty clay, clay, silty clay loam	CH, CL, ML, MH	A-6, A-7	0	0-5	70-100	65-100	60-100	55-1
	64-74	Weathered bedrock			---	---	---	---	---	---
Beech----------	0-2	Silt loam	CL, ML, CL-ML	A-4	0	0-5	65-95	60-90	55-85	45-8
	2-41	Channery loam, channery clay loam, very channery loam, clay loam	SC, ML, CL	A-2, A-4, A-6	0	0-16	45-95	40-90	35-85	30-7
	41-80	Very channery loam, very channery silt loam, channery clay loam, clay loam	SC, ML, CL	A-2, A-4, A-6	0	0-21	40-95	35-90	30-85	25-7
W. Water										

Table 15.—Physical Soil Properties

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors		
								Kw	Kf	T
	In	Pct	g/cc	In/hr	In/in	Pct	Pct			
AaB, AaC, AbB, AbC, AeB:										
Allegheny	0-8	15-27	1.20-1.40	0.6-2	0.12-0.22	0.0-2.9	1.0-4.0	.32	.32	4
	8-52	18-35	1.20-1.50	0.6-2	0.13-0.18	0.0-2.9	0.2-0.8	.28	.28	
	52-89	10-35	1.20-1.40	0.6-6	0.08-0.17	0.0-2.9	0.0-0.5	.28	.28	
BlC:										
Blairton	0-5	12-27	1.40-1.60	0.6-2	0.14-0.18	0.0-2.9	1.0-4.0	.43	.43	3
	5-23	18-35	1.50-1.70	0.2-0.6	0.08-0.14	0.0-2.9	0.0-0.5	.32	.32	
	23-37	7-27	1.40-1.60	0.2-2	0.04-0.10	0.0-2.9	0.0-0.5	.32	.49	
	37-47	---	---	---	---	---	---	---	---	
Cruze	0-2	15-27	1.30-1.50	0.6-2	0.19-0.24	0.0-2.9	1.0-3.0	.43	.43	3
	2-18	20-50	1.35-1.55	0.2-0.6	0.13-0.22	3.0-5.9	0.3-1.0	.32	.32	
	18-48	32-55	1.40-1.65	0.06-0.6	0.08-0.16	6.0-8.9	0.1-0.5	.32	.49	
	48-58	---	---	---	---	---	---	---	---	
Marrowbone	0-4	5-18	1.20-1.60	0.6-6	0.10-0.18	0.0-2.9	0.5-5.0	.24	.24	2
	4-35	5-27	1.20-1.70	0.6-6	0.08-0.16	0.0-2.9	0.0-0.5	.17	.20	
	35-40	---	---	---	---	---	---	---	---	
	40-44	---	---	---	---	---	---	---	---	
BlD:										
Blairton	0-5	10-27	1.40-1.60	0.6-2	0.14-0.18	0.0-2.9	1.0-4.0	.43	.43	3
	5-23	18-35	1.50-1.70	0.2-0.6	0.08-0.14	0.0-2.9	0.0-0.5	.32	.32	
	23-37	20-27	1.40-1.60	0.2-2	0.04-0.10	0.0-2.9	0.0-0.5	.32	.49	
	37-47	---	---	---	---	---	---	---	---	
Cruze	0-2	15-27	1.30-1.50	0.6-2	0.19-0.24	0.0-2.9	1.0-3.0	.43	.43	3
	2-18	20-50	1.35-1.55	0.2-0.6	0.13-0.22	3.0-5.9	0.3-1.0	.32	.32	
	18-48	32-55	1.40-1.65	0.06-0.6	0.08-0.16	6.0-8.9	0.1-0.5	.32	.49	
	48-58	---	---	---	---	---	---	---	---	
Marrowbone	0-4	5-18	1.20-1.60	0.6-6	0.10-0.18	0.0-2.9	0.5-5.0	.24	.24	2
	4-35	5-27	1.20-1.70	0.6-6	0.08-0.16	0.0-2.9	0.0-0.5	.17	.20	
	35-40	---	---	---	---	---	---	---	---	
	40-44	---	---	---	---	---	---	---	---	
Ch:										
Chagrin	0-10	10-27	1.20-1.40	0.6-2	0.20-0.24	0.0-2.9	2.0-4.0	.32	.32	5
	10-82	18-27	1.20-1.50	0.6-2	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32	
	82-90	5-27	1.20-1.40	0.6-2	0.08-0.20	0.0-2.9	0.3-1.0	.32	.32	
ClF:										
Cloverlick	0-9	18-27	1.00-1.20	0.6-6	0.20-0.24	0.0-2.9	5.0-15	.10	.20	3
	9-18	15-27	1.10-1.30	0.6-6	0.18-0.24	0.0-2.9	0.5-1.0	.10	.10	
	18-48	15-27	1.30-1.50	0.6-6	0.12-0.20	0.0-2.9	0.0-0.5	.10	.24	
	48-86	15-27	1.30-1.60	0.6-6	0.05-0.12	0.0-2.9	0.0-0.5	.10	.24	
Hazleton	0-3	7-18	1.20-1.40	2-6	0.10-0.14	0.0-2.9	2.0-4.0	.17	.24	3
	3-80	5-15	1.20-1.40	2-20	0.06-0.12	0.0-2.9	0.0-0.5	.15	.28	
Shelocta	0-3	10-25	1.15-1.30	0.6-2	0.16-0.22	0.0-2.9	0.5-5.0	.32	.32	4
	3-39	18-34	1.30-1.55	0.6-2	0.10-0.20	0.0-2.9	0.2-0.8	.28	.37	
	39-51	15-34	1.30-1.55	0.6-6	0.08-0.16	0.0-2.9	0.0-0.5	.17	.28	
	51-61	---	---	---	---	---	---	---	---	

Table 15.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors		
								Kw	Kf	T
	In	Pct	g/cc	In/hr	In/in	Pct	Pct			
CmB, CmC, CoB, CoC, CtB:										
Cotaco	0-9	7-27	1.20-1.40	0.6-6	0.12-0.20	0.0-2.9	0.5-4.0	.37	.37	3
	9-55	18-35	1.20-1.50	0.6-2	0.07-0.15	0.0-2.9	0.5-1.0	.28	.28	
	55-85	18-35	1.20-1.50	0.6-2	0.07-0.15	0.0-2.9	0.0-0.5	.28	.28	
DAM. Dams, large										
Dm. Dumps, mine; tailings; and tipples										
FiB, FiD, FiF:										
Fiveblock	0-4	5-18	1.35-1.65	2-20	0.05-0.12	0.0-2.9	0.0-0.5	.32	.43	5
	4-80	5-18	1.35-1.65	2-20	0.05-0.12	0.0-2.9	0.0-0.3	.32	.43	
Fairpoint	0-7	18-27	1.40-1.55	0.6-2	0.09-0.16	0.0-2.9	0.0-0.5	.28	.55	5
	7-80	18-35	1.60-1.80	0.2-0.6	0.03-0.10	3.0-5.9	0.0-0.3	.28	.64	
Kaymine	0-6	18-27	1.35-1.65	0.6-6	0.07-0.16	0.0-2.9	0.0-0.5	.32	.43	5
	6-80	18-27	1.35-1.65	0.6-6	0.07-0.16	0.0-2.9	0.0-0.3	.32	.43	
Gr:										
Grigsby	0-11	5-10	1.20-1.50	2-6	0.08-0.14	0.0-2.9	1.0-4.0	.28	.28	5
	11-64	5-18	1.20-1.50	0.6-6	0.10-0.20	0.0-2.9	0.2-0.8	.28	.28	
	64-80	5-10	1.20-1.50	2-6	0.03-0.16	0.0-2.9	0.0-0.5	.28	.28	
HaC:										
Hayter	0-10	10-25	1.25-1.55	2-6	0.10-0.16	0.0-2.9	1.0-3.0	.28	.28	4
	10-70	20-35	1.30-1.60	2-6	0.11-0.19	3.0-5.9	0.0-0.5	.28	.28	
	70-80	7-40	1.30-1.60	2-6	0.06-0.10	0.0-2.9	0.0-0.5	.17	.17	
Grigsby	0-11	5-10	1.20-1.50	2-6	0.08-0.14	0.0-2.9	1.0-4.0	.28	.28	5
	11-64	5-18	1.20-1.50	0.6-6	0.10-0.20	0.0-2.9	0.2-0.8	.28	.28	
	64-80	5-10	1.20-1.50	2-6	0.03-0.16	0.0-2.9	0.0-0.5	.28	.28	
HnF:										
Hazleton	0-3	7-18	1.20-1.40	2-6	0.10-0.14	0.0-2.9	2.0-4.0	.17	.24	3
	3-80	5-15	1.20-1.40	2-20	0.06-0.12	0.0-2.9	0.0-0.5	.15	.28	
Shelocta	0-3	10-25	1.15-1.30	0.6-2	0.12-0.18	0.0-2.9	0.5-5.0	.32	.32	4
	3-39	18-34	1.30-1.55	0.6-2	0.10-0.20	0.0-2.9	0.2-0.8	.28	.37	
	39-51	15-34	1.30-1.55	0.6-6	0.08-0.16	0.0-2.9	0.0-0.5	.17	.28	
	51-61	---	---	---	---	---	---	---	---	
Fedscreek	0-4	5-18	1.00-1.60	2-6	0.08-0.16	0.0-2.9	0.5-5.0	.24	.24	4
	4-74	5-27	1.20-1.70	2-6	0.10-0.18	0.0-2.9	0.2-0.8	.17	.17	
	74-82	5-27	1.20-1.70	0.6-6	0.10-0.18	0.0-2.9	0.0-0.5	.17	.24	
Ho:										
Holly	0-9	15-27	1.20-1.40	0.6-2	0.20-0.24	0.0-2.9	2.0-5.0	.28	.28	5
	9-20	15-27	1.20-1.50	0.2-2	0.17-0.21	0.0-2.9	0.5-2.0	.28	.28	
	20-61	10-27	1.20-1.45	0.6-6	0.10-0.20	0.0-2.9	0.5-2.0	.28	.28	
	61-80	10-27	1.20-1.40	0.6-6	0.07-0.18	0.0-2.9	0.5-2.0	.28	.28	
MaF:										
Marrowbone	0-4	5-18	1.20-1.60	0.6-6	0.10-0.18	0.0-2.9	0.5-5.0	.24	.24	2
	4-35	5-27	1.20-1.70	0.6-6	0.08-0.16	0.0-2.9	0.0-0.5	.17	.20	
	35-40	---	---	---	---	---	---	---	---	
	40-44	---	---	---	---	---	---	---	---	

Table 15.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors		
								Kw	Kf	T
	In	Pct	g/cc	In/hr	In/in	Pct	Pct			
MaF:										
Blairton	0-5	10-27	1.40-1.60	0.6-2	0.12-0.16	0.0-2.9	1.0-4.0	.43	.43	3
	5-23	18-35	1.50-1.70	0.2-0.6	0.08-0.14	0.0-2.9	0.0-0.5	.32	.32	
	23-37	7-27	1.40-1.60	0.2-2	0.04-0.10	0.0-2.9	0.0-0.5	.32	.49	
	37-47	---	---	---	---	---	---	---	---	
Dekalb	0-4	10-18	1.20-1.50	6-20	0.08-0.12	0.0-2.9	2.0-5.0	.17	.24	2
	4-24	7-18	1.20-1.50	6-20	0.06-0.12	0.0-2.9	0.0-0.5	.17	.24	
	24-28	---	---	---	---	---	---	---	---	
NeD:										
Nelse	0-12	5-18	1.20-1.60	2-6	0.09-0.14	0.0-2.9	2.0-10	.17	.17	5
	12-44	2-18	1.40-1.80	2-20	0.09-0.14	0.0-2.9	0.5-1.0	.15	.15	
	44-80	2-12	1.40-1.80	2-20	0.05-0.10	0.0-2.9	0.3-1.0	.15	.15	
Or:										
Orrville	0-10	12-27	1.25-1.45	0.6-2	0.18-0.22	0.0-2.9	2.0-4.0	.37	.37	5
	10-30	18-30	1.30-1.50	0.6-2	0.15-0.19	0.0-2.9	0.5-1.0	.37	.37	
	30-80	10-40	1.20-1.40	0.6-6	0.08-0.15	0.0-2.9	0.1-0.3	.37	.37	
RaF:										
Rayne	0-3	15-27	1.10-1.30	0.6-2	0.14-0.20	0.0-2.9	1.0-3.0	.28	.28	3
	3-37	15-35	1.20-1.50	0.06-0.6	0.12-0.16	3.0-5.9	0.2-0.8	.15	.20	
	37-49	20-40	1.20-1.60	0.06-0.6	0.08-0.12	3.0-5.9	0.0-0.5	.20	.20	
	49-59	---	---	---	---	---	---	---	---	
Marrowbone	0-4	5-18	1.20-1.60	2-6	0.08-0.15	0.0-2.9	0.5-5.0	.24	.24	2
	4-35	5-27	1.20-1.70	2-6	0.08-0.16	0.0-2.9	0.0-0.5	.17	.20	
	35-40	---	---	---	---	---	---	---	---	
	40-44	---	---	---	---	---	---	---	---	
Dekalb	0-4	10-18	1.20-1.50	6-20	0.08-0.12	0.0-2.9	2.0-5.0	.17	.24	2
	4-24	7-18	1.20-1.50	6-20	0.06-0.12	0.0-2.9	0.0-0.5	.17	.24	
	24-28	---	---	---	---	---	---	---	---	
RoF:										
Rigley	0-6	7-18	1.20-1.40	2-6	0.09-0.15	0.0-2.9	0.5-3.0	.24	.24	4
	6-53	7-18	1.30-1.60	2-6	0.09-0.15	0.0-2.9	0.2-0.8	.17	.17	
	53-80	7-40	1.30-1.60	2-6	0.07-0.15	0.0-2.9	0.0-0.5	.10	.17	
Rock outcrop.										
SeE:										
Shelocta	0-3	10-25	1.15-1.30	0.6-2	0.16-0.22	0.0-2.9	0.5-5.0	.32	.32	4
	3-39	18-34	1.30-1.55	0.6-2	0.10-0.20	0.0-2.9	0.2-0.8	.28	.37	
	39-51	15-34	1.30-1.55	0.6-6	0.08-0.16	0.0-2.9	0.0-0.5	.17	.28	
	51-61	---	---	---	---	---	---	---	---	
SgC:										
Shelocta	0-3	10-25	1.15-1.30	0.6-2	0.16-0.22	0.0-2.9	0.5-5.0	.32	.32	4
	3-39	18-34	1.30-1.55	0.6-2	0.10-0.20	0.0-2.9	0.2-0.8	.28	.37	
	39-51	15-34	1.30-1.55	0.6-6	0.08-0.16	0.0-2.9	0.0-0.5	.17	.28	
	51-61	---	---	---	---	---	---	---	---	
Grigsby	0-11	5-10	1.20-1.50	2-6	0.08-0.14	0.0-2.9	1.0-4.0	.28	.28	5
	11-64	5-18	1.20-1.50	0.6-6	0.10-0.20	0.0-2.9	0.2-0.8	.28	.28	
	64-80	5-10	1.20-1.50	2-6	0.03-0.16	0.0-2.9	0.0-0.5	.28	.28	
Orrville	0-10	12-27	1.25-1.45	0.6-2	0.18-0.22	0.0-2.9	2.0-4.0	.37	.37	5
	10-30	18-30	1.30-1.50	0.6-2	0.15-0.19	0.0-2.9	0.5-1.0	.37	.37	
	30-80	12-40	1.20-1.40	0.6-6	0.08-0.15	0.0-2.9	0.1-0.3	.37	.37	

Table 15.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors		
								Kw	Kf	T
	In	Pct	g/cc	In/hr	In/in	Pct	Pct			
ShF:										
Shelocta	0-3	10-25	1.15-1.30	0.6-2	0.16-0.22	0.0-2.9	0.5-5.0	.32	.32	4
	3-39	18-34	1.30-1.55	0.6-2	0.10-0.20	0.0-2.9	0.2-0.8	.28	.37	
	39-51	15-34	1.30-1.55	0.6-6	0.08-0.16	0.0-2.9	0.0-0.5	.17	.28	
	51-61	---	---	---	---	---	---	---	---	
Hazleton	0-3	7-18	1.20-1.40	2-6	0.10-0.14	0.0-2.9	2.0-4.0	.17	.24	3
	3-80	5-15	1.20-1.40	2-20	0.06-0.12	0.0-2.9	0.0-0.5	.15	.28	
Fedscreek	0-4	5-18	1.00-1.60	2-6	0.08-0.16	0.0-2.9	0.5-5.0	.24	.24	4
	4-74	5-27	1.20-1.70	2-6	0.10-0.18	0.0-2.9	0.2-0.8	.17	.17	
	74-82	5-27	1.20-1.70	0.6-6	0.10-0.18	0.0-2.9	0.0-0.5	.17	.24	
UdC, UdF. Udorthents-Urban land										
UpC, UpD, UpF:										
Upshur	0-3	27-35	1.20-1.50	0.2-0.6	0.12-0.16	3.0-5.9	0.5-3.0	.37	.37	3
	3-42	40-55	1.30-1.60	0.06-0.2	0.10-0.14	6.0-8.9	0.5-1.0	.32	.32	
	42-52	27-45	1.30-1.60	0.06-0.2	0.08-0.12	3.0-5.9	0.0-0.5	.32	.32	
	52-62	---	---	---	---	---	---	---	---	
Rarden	0-3	17-27	1.30-1.50	0.6-2	0.21-0.24	0.0-2.9	1.0-3.0	.43	.43	3
	3-26	35-60	1.40-1.60	0.06-0.2	0.10-0.14	6.0-8.9	0.2-1.0	.32	.32	
	26-36	---	---	---	---	---	---	---	---	
VaF:										
Vandalia	0-4	15-27	1.20-1.50	0.2-2	0.12-0.18	3.0-5.9	1.0-3.0	.37	.37	4
	4-47	35-50	1.30-1.60	0.06-0.6	0.12-0.15	6.0-8.9	0.5-1.0	.32	.32	
	47-69	27-50	1.30-1.60	0.06-0.6	0.08-0.12	6.0-8.9	0.0-0.5	.32	.43	
	69-79	---	---	---	---	---	---	---	---	
Beech	0-4	10-27	1.20-1.40	0.6-2	0.14-0.20	0.0-2.9	1.0-4.0	.28	.32	5
	4-36	18-40	1.30-1.60	0.2-2	0.10-0.16	3.0-5.9	0.0-0.5	.24	.28	
	36-80	15-40	1.30-1.60	0.2-2	0.08-0.13	3.0-5.9	0.0-0.5	.20	.28	
VaF2:										
Vandalia	0-2	15-27	1.20-1.50	0.2-2	0.12-0.18	3.0-5.9	1.0-3.0	.37	.37	4
	2-54	35-50	1.30-1.60	0.06-0.6	0.12-0.15	6.0-8.9	0.5-1.0	.32	.32	
	54-64	27-60	1.30-1.60	0.06-0.6	0.08-0.12	6.0-8.9	0.0-0.5	.32	.32	
	64-74	---	---	---	---	---	---	---	---	
Beech	0-2	10-27	1.20-1.40	0.6-2	0.14-0.20	0.0-2.9	1.0-4.0	.28	.32	5
	2-41	18-35	1.30-1.60	0.2-2	0.10-0.16	3.0-5.9	0.0-0.5	.24	.28	
	41-80	15-40	1.30-1.60	0.2-2	0.08-0.13	3.0-5.9	0.0-0.5	.20	.28	
W. Water										

Table 16.—Chemical Soil Properties

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction
	In	meq/100 g	meq/100 g	pH
AaB, AaC, AbB, AbC, AeB:				
Allegheny	0-8	---	5.0-10	3.6-5.5
	8-52	---	2.5-8.0	3.6-5.5
	52-89	---	2.0-5.0	3.6-5.5
BlC, BlD:				
Blairton	0-5	10-22	---	5.1-7.3
	5-23	---	8.0-16	3.5-5.5
	23-37	---	8.0-16	3.5-5.5
	37-47	---	---	---
Cruze	0-2	---	8.0-22	3.6-6.0
	2-18	---	8.0-21	3.6-5.5
	18-48	---	14-33	3.6-5.5
	48-58	---	0.0-0.0	---
Marrowbone	0-4	---	---	3.6-6.5
	4-35	---	---	3.6-6.0
	35-40	---	---	---
	40-44	---	---	---
Ch:				
Chagrin	0-10	10-24	---	5.6-7.3
	10-82	10-20	---	5.6-7.3
	82-90	2.0-12	---	5.6-7.3
ClF:				
Cloverlick	0-9	---	---	3.6-6.0
	9-18	---	---	3.6-5.5
	18-48	---	---	3.6-5.5
	48-86	---	---	3.6-5.5
Hazleton	0-3	---	---	3.5-5.5
	3-80	---	---	3.5-5.5
Shelocta	0-3	---	5.0-16	4.5-5.5
	3-39	---	3.0-15	4.5-5.5
	39-51	---	5.0-20	4.5-5.5
	51-61	---	---	---
CmB, CmC:				
Cotaco	0-9	---	5.0-14	3.6-5.5
	9-55	---	10-20	3.6-5.5
	55-85	---	10-20	3.6-5.5
CoB, CoC, CtB:				
Cotaco	0-9	---	5.0-14	3.6-5.5
	9-55	---	10-20	3.6-5.5
	55-85	---	10-20	3.6-5.5
DAM.				
Dams, large				
Dm.				
Dumps, mine; tailings; and tipples				

Table 16.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction
	In	meq/100 g	meq/100 g	pH
FiB, FiD, FiF:				
Fiveblock	0-4	---	---	5.6-7.8
	4-80	---	---	5.6-7.8
Fairpoint	0-7	7.0-15	---	5.6-7.3
	7-80	7.0-20	---	5.6-7.3
Kaymine	0-6	---	---	5.6-7.8
	6-80	---	---	5.6-7.8
Gr:				
Grigsby	0-11	---	---	5.6-7.3
	11-64	---	---	5.6-7.3
	64-80	---	---	5.1-7.3
HaC:				
Hayter	0-10	---	---	5.1-6.5
	10-70	---	---	5.1-6.5
	70-80	---	---	5.1-6.5
Grigsby	0-11	---	---	5.6-7.3
	11-64	---	---	5.6-7.3
	64-80	---	---	5.1-7.3
HnF:				
Hazleton	0-3	---	---	3.5-5.5
	3-80	---	---	3.5-5.5
Shelocta	0-3	---	---	4.5-5.5
	3-39	---	---	4.5-5.5
	39-51	---	5.0-20	4.5-5.5
	51-61	---	---	---
Fedscreek	0-4	---	---	4.5-6.5
	4-74	---	---	4.5-6.0
	74-82	---	---	4.5-6.0
Ho:				
Holly	0-9	10-24	---	5.6-7.3
	9-20	10-18	---	5.1-7.3
	20-61	5.0-14	---	5.6-7.8
	61-80	5.0-12	---	5.6-7.8
MaF:				
Marrowbone	0-4	---	---	3.6-6.5
	4-35	---	---	3.6-6.0
	35-40	---	---	---
	40-44	---	---	---
Blairton	0-5	---	10-20	3.6-5.5
	5-23	---	8.0-16	3.6-5.5
	23-37	---	8.0-15	3.6-5.5
	37-47	---	---	---
Dekalb	0-4	---	10-18	3.5-4.4
	4-24	---	5.0-10	3.5-5.5
	24-28	---	---	---
NeD:				
Nelse	0-12	---	---	5.1-8.4
	12-44	---	---	5.1-8.4
	44-80	---	---	5.1-8.4

Table 16.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction
	In	meq/100 g	meq/100 g	pH
Or:				
Orrville	0-10	10-20	---	5.1-7.3
	10-30	10-16	---	5.1-6.5
	30-80	5.0-12	---	5.1-7.3
RaF:				
Rayne	0-3	---	---	4.5-5.5
	3-37	---	---	4.5-5.5
	37-49	---	---	4.0-5.0
	49-59	---	---	---
Marrowbone	0-4	---	---	3.6-6.5
	4-35	---	---	3.6-6.0
	35-40	---	---	---
	40-44	---	---	---
Dekalb	0-4	---	10-18	3.5-4.4
	4-24	---	5.0-10	3.5-5.5
	24-28	---	---	---
RoF:				
Rigley	0-6	---	---	4.5-7.3
	6-53	---	---	3.6-5.5
	53-80	---	---	3.6-5.5
Rock outcrop.				
SeE:				
Shelocta	0-3	---	5.0-16	4.5-5.5
	3-39	---	3.0-15	4.5-5.5
	39-51	---	5.0-20	4.5-5.5
	51-61	---	---	---
SgC:				
Shelocta	0-3	---	5.0-16	4.5-5.5
	3-39	---	3.0-15	4.5-5.5
	39-51	---	5.0-20	4.5-5.5
	51-61	---	---	---
Grigsby	0-11	---	---	5.6-7.3
	11-64	---	---	5.6-7.3
	64-80	---	---	5.1-7.3
Orrville	0-10	10-20	---	5.1-7.3
	10-30	10-16	---	5.1-6.5
	30-80	5.0-12	---	5.1-7.3
ShF:				
Shelocta	0-3	---	5.0-16	4.5-5.5
	3-39	---	3.0-15	4.5-5.5
	39-51	---	5.0-20	4.5-5.5
	51-61	---	---	---
Hazleton	0-3	---	---	3.5-5.5
	3-80	---	---	3.5-5.5
Fedscreek	0-4	---	---	4.5-6.5
	4-74	---	---	4.5-6.0
	74-82	---	---	4.5-6.0
UdC, UdF.				
Udorthents-Urban land				

Table 16.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction
	In	meq/100 g	meq/100 g	pH
UpC, UpD, UpF:				
Upshur	0-3	---	---	4.5-6.5
	3-42	---	---	4.5-8.4
	42-52	---	---	5.1-8.4
	52-62	---	---	---
Rarden	0-3	---	8.0-15	3.6-6.5
	3-26	---	17-30	3.6-5.5
	26-36	---	0.0-0.0	---
VaF:				
Vandalia	0-4	---	---	4.5-6.0
	4-47	---	---	4.5-6.0
	47-69	---	---	5.1-7.3
	69-79	---	---	---
Beech	0-4	---	15-25	4.5-6.0
	4-36	---	15-25	4.5-6.0
	36-80	---	15-30	4.5-6.0
VaF2:				
Vandalia	0-2	---	---	4.5-6.0
	2-54	---	---	4.5-6.0
	54-64	---	---	5.1-7.3
	64-74	---	---	---
Beech	0-2	---	15-25	4.5-6.0
	2-41	---	15-25	4.5-6.0
	41-80	---	15-30	4.5-6.0
W.				
Water				

Table 17.—Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding	Flooding	
				Upper limit	Lower limit	frequency	Duration	Frequency
				Ft	Ft			
AaB:								
Allegheny	B	Low						
			Jan-Dec	---	---	None	---	None
AaC:								
Allegheny	B	Medium						
			Jan-Dec	---	---	None	---	None
AbB:								
Allegheny	B	Low						
			January	---	---	None	---	Rare
			February	---	---	None	---	Rare
			March	---	---	None	---	Rare
			April	---	---	None	---	Rare
			November	---	---	None	---	Rare
			December	---	---	None	---	Rare
AbC:								
Allegheny	B	Medium						
			January	---	---	None	---	Rare
			February	---	---	None	---	Rare
			March	---	---	None	---	Rare
			April	---	---	None	---	Rare
			November	---	---	None	---	Rare
			December	---	---	None	---	Rare
AeB:								
Allegheny	B	Low						
			January	---	---	None	Brief	Occasional
			February	---	---	None	Brief	Occasional
			March	---	---	None	Brief	Occasional
			April	---	---	None	Brief	Occasional
			November	---	---	None	Brief	Occasional
			December	---	---	None	Brief	Occasional
BlC, BlD:								
Blairton	C	High						
			January	1.2-2.5	1.7-3.3	None	---	None
			February	1.2-2.5	1.7-3.3	None	---	None
			March	1.2-2.5	1.7-3.3	None	---	None
			November	1.2-2.5	1.7-3.3	None	---	None
			December	1.2-2.5	1.7-3.3	None	---	None
Cruze	C	High						
			January	1.5-3.0	3.3-5.0	None	---	None
			February	1.5-3.0	3.3-5.0	None	---	None
			March	1.5-3.0	3.3-5.0	None	---	None
			April	1.5-3.0	3.3-5.0	None	---	None
Marrowbone	C	High						
			Jan-Dec	---	---	None	---	None

Table 17.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding frequency	Flooding	
				Upper limit	Lower limit		Duration	Frequency
				Ft	Ft			
Ch:								
Chagrin	B	Low						
			January	---	---	None	Brief	Frequent
			February	4.0-6.0	>6.0	None	Brief	Frequent
			March	4.0-6.0	>6.0	None	Brief	Frequent
			April	---	---	None	Brief	Frequent
			May	---	---	None	Brief	Frequent
			November	---	---	None	Brief	Frequent
			December	---	---	None	Brief	Frequent
ClF:								
Cloverlick	B	High						
			Jan-Dec	---	---	None	---	None
Hazleton	B	Medium						
			Jan-Dec	---	---	None	---	None
Shelocta	B	High						
			Jan-Dec	---	---	None	---	None
CmB:								
Cotaco	C	Low						
			January	1.5-2.5	>6.0	None	---	None
			February	1.5-2.5	>6.0	None	---	None
			March	1.5-2.5	>6.0	None	---	None
			April	1.5-2.5	>6.0	None	---	None
			May	1.5-2.5	>6.0	None	---	None
			November	1.5-2.5	>6.0	None	---	None
			December	1.5-2.5	>6.0	None	---	None
CmC:								
Cotaco	C	Medium						
			January	1.5-2.5	>6.0	None	---	None
			February	1.5-2.5	>6.0	None	---	None
			March	1.5-2.5	>6.0	None	---	None
			April	1.5-2.5	>6.0	None	---	None
			May	1.5-2.5	>6.0	None	---	None
			November	1.5-2.5	>6.0	None	---	None
			December	1.5-2.5	>6.0	None	---	None
CoB:								
Cotaco	C	Low						
			January	1.5-2.5	>6.0	None	---	Rare
			February	1.5-2.5	>6.0	None	---	Rare
			March	1.5-2.5	>6.0	None	---	Rare
			April	1.5-2.5	>6.0	None	---	Rare
			May	1.5-2.5	>6.0	None	---	None
			November	1.5-2.5	>6.0	None	---	Rare
			December	1.5-2.5	>6.0	None	---	Rare
CoC:								
Cotaco	C	Medium						
			January	1.5-2.5	>6.0	None	---	Rare
			February	1.5-2.5	>6.0	None	---	Rare
			March	1.5-2.5	>6.0	None	---	Rare
			April	1.5-2.5	>6.0	None	---	Rare
			May	1.5-2.5	>6.0	None	---	None
			November	1.5-2.5	>6.0	None	---	Rare
			December	1.5-2.5	>6.0	None	---	Rare

Table 17.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding frequency	Flooding	
				Upper limit	Lower limit		Duration	Frequency
				Ft	Ft			
CtB:								
Cotaco	C	Low						
			January	1.5-2.5	>6.0	None	Brief	Occasional
			February	1.5-2.5	>6.0	None	Brief	Occasional
			March	1.5-2.5	>6.0	None	Brief	Occasional
			April	1.5-2.5	>6.0	None	Brief	Occasional
			May	1.5-2.5	>6.0	None	---	None
			November	1.5-2.5	>6.0	None	Brief	Occasional
			December	1.5-2.5	>6.0	None	Brief	Occasional
DAM.								
Dams, large								
Dm.								
Dumps, mine; tailings; and tipples								
FiB:								
Fiveblock	C	Very low	Jan-Dec	---	---	None	---	None
Fairpoint	C	Medium	Jan-Dec	---	---	None	---	None
Kaymine	C	Low	Jan-Dec	---	---	None	---	None
FiD:								
Fiveblock	C	Low	Jan-Dec	---	---	None	---	None
Fairpoint	C	High	Jan-Dec	---	---	None	---	None
Kaymine	C	Medium	Jan-Dec	---	---	None	---	None
FiF:								
Fiveblock	C	Medium	Jan-Dec	---	---	None	---	None
Fairpoint	C	Very high	Jan-Dec	---	---	None	---	None
Kaymine	C	High	Jan-Dec	---	---	None	---	None
Gr:								
Grigsby	B	Low						
			January	3.5-6.0	>6.0	None	Brief	Frequent
			February	3.5-6.0	>6.0	None	Brief	Frequent
			March	3.5-6.0	>6.0	None	Brief	Frequent
			April	3.5-6.0	>6.0	None	Brief	Frequent
			May	---	---	None	Brief	Frequent
			December	---	---	None	Brief	Frequent

Table 17.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding frequency	Flooding	
				Upper limit	Lower limit		Duration	Frequency
				Ft	Ft			
HaC:								
Hayter	B	Low						
			January	---	---	None	---	Rare
			February	---	---	None	---	Rare
			March	---	---	None	---	Rare
			April	---	---	None	---	Rare
			May	---	---	None	---	Rare
			December	---	---	None	---	Rare
Grigsby	B	Low						
			January	3.5-6.0	>6.0	None	Brief	Frequent
			February	3.5-6.0	>6.0	None	Brief	Frequent
			March	3.5-6.0	>6.0	None	Brief	Frequent
			April	3.5-6.0	>6.0	None	Brief	Frequent
			May	---	---	None	Brief	Frequent
			December	---	---	None	Brief	Frequent
HnF:								
Hazleton	B	Medium						
			Jan-Dec	---	---	None	---	None
Shelocta	B	High						
			Jan-Dec	---	---	None	---	None
Fedscreek	B	Medium						
			Jan-Dec	---	---	None	---	None
Ho:								
Holly	B/D	Low						
			January	0.0-1.0	>6.0	None	Long	Frequent
			February	0.0-1.0	>6.0	None	Long	Frequent
			March	0.0-1.0	>6.0	None	Long	Frequent
			April	0.0-1.0	>6.0	None	Long	Frequent
			May	0.0-1.0	>6.0	None	Long	Frequent
			November	---	---	None	Long	Frequent
			December	0.0-1.0	>6.0	None	Long	Frequent
MaF:								
Marrowbone	C	High						
			Jan-Dec	---	---	None	---	None
Blairton	C	Very high						
			January	1.2-2.5	1.7-3.3	None	---	None
			February	1.2-2.5	1.7-3.3	None	---	None
			March	1.2-2.5	1.7-3.3	None	---	None
			November	1.2-2.5	1.7-3.3	None	---	None
			December	1.2-2.5	1.7-3.3	None	---	None
Dekalb	C	Low						
			Jan-Dec	---	---	None	---	None
NeD:								
Nelse	B	Low						
			January	---	---	None	Brief	Frequent
			February	4.0-6.0	>6.0	None	Brief	Frequent
			March	4.0-6.0	>6.0	None	Brief	Frequent
			April	---	---	None	Brief	Frequent
			May	---	---	None	Brief	Frequent
			June	---	---	None	Brief	Frequent
			July	---	---	None	Brief	Frequent
			August	---	---	None	Brief	Frequent
			September	---	---	None	Brief	Frequent
			October	---	---	None	Brief	Frequent
			November	---	---	None	Brief	Frequent
			December	---	---	None	Brief	Frequent

Table 17.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding frequency	Flooding	
				Upper limit	Lower limit		Duration	Frequency
				Ft	Ft			
Or:								
Orrville----------	C	Low						
			January	1.0-1.5	>6.0	None	Brief	Frequent
			February	1.0-1.5	>6.0	None	Brief	Frequent
			March	1.0-1.5	>6.0	None	Brief	Frequent
			April	1.0-1.5	>6.0	None	Brief	Frequent
			May	1.0-1.5	>6.0	None	Brief	Frequent
			June	1.0-1.5	>6.0	None	---	None
			November	1.0-1.5	>6.0	None	Brief	Frequent
			December	1.0-1.5	>6.0	None	Brief	Frequent
RaF:								
Rayne----------	B	High						
			Jan-Dec	---	---	None	---	None
Marrowbone--------	C	High						
			Jan-Dec	---	---	None	---	None
Dekalb----------	C	Low						
			Jan-Dec	---	---	None	---	None
RoF:								
Rigley----------	B	Medium						
			Jan-Dec	---	---	None	---	None
Rock outcrop.								
SeE:								
Shelocta----------	B	High						
			Jan-Dec	---	---	None	---	None
SgC:								
Shelocta----------	B	Medium						
			Jan-Dec	---	---	None	---	None
Grigsby----------	B	Low						
			January	3.5-6.0	>6.0	None	Brief	Frequent
			February	3.5-6.0	>6.0	None	Brief	Frequent
			March	3.5-6.0	>6.0	None	Brief	Frequent
			April	3.5-6.0	>6.0	None	Brief	Frequent
			May	---	---	None	Brief	Frequent
			December	---	---	None	Brief	Frequent
Orrville----------	C	Low						
			January	1.0-1.5	>6.0	None	Brief	Frequent
			February	1.0-1.5	>6.0	None	Brief	Frequent
			March	1.0-1.5	>6.0	None	Brief	Frequent
			April	1.0-1.5	>6.0	None	Brief	Frequent
			May	1.0-1.5	>6.0	None	Brief	Frequent
			June	1.0-1.5	>6.0	None	---	None
			November	1.0-1.5	>6.0	None	Brief	Frequent
			December	1.0-1.5	>6.0	None	Brief	Frequent
ShF:								
Shelocta----------	B	High						
			Jan-Dec	---	---	None	---	None
Hazleton----------	B	Medium						
			Jan-Dec	---	---	None	---	None
Fedscreek---------	B	Medium						
			Jan-Dec	---	---	None	---	None

Table 17.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding frequency	Flooding	
				Upper limit	Lower limit		Duration	Frequency
				Ft	Ft			
UdC, UdF.								
Udorthents-								
Urban land								
UpC, UpD, UpF:								
Upshur	D	Very high						
			Jan-Dec	---	---	None	---	None
Rarden	C	Very high						
			January	1.5-3.0	3.3-3.3	None	---	None
			February	1.5-3.0	3.3-3.3	None	---	None
			March	1.5-3.0	3.3-3.3	None	---	None
			April	1.5-3.0	3.3-3.3	None	---	None
VaF, VaF2:								
Vandalia	D	Very high						
			February	4.0-6.0	>6.0	None	---	None
			March	4.0-6.0	>6.0	None	---	None
			April	4.0-6.0	>6.0	None	---	None
Beech	C	High						
			February	1.5-3.0	>6.0	None	---	None
			March	1.5-3.0	>6.0	None	---	None
			April	1.5-3.0	>6.0	None	---	None
W.								
Water								

Table 18.—Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness		Uncoated steel	Concrete
		In				
AaB, AaC, AbB, AbC, AeB:						
Allegheny	---	---	---	None	Low	High
BlC, BlD:						
Blairton	Bedrock (paralithic)	20-40	Moderately cemented	None	High	High
Cruze	Bedrock (paralithic)	40-60	Moderately cemented	None	High	High
Marrowbone	Bedrock (lithic)	20-40	Very strongly cemented	None	Low	Moderate
Ch:						
Chagrin	---	---	---	None	Low	Moderate
ClF:						
Cloverlick	---	---	---	None	Low	High
Hazleton	---	---	---	None	Low	High
Shelocta	Bedrock (paralithic)	40-60	Strongly cemented	None	Low	High
CmB, CmC, CoB, CoC, CtB:						
Cotaco	---	---	---	None	Moderate	High
DAM.						
Dams, large						
Dm.						
Dumps, mine; tailings; and tipples						
FiB, FiD, FiF:						
Fiveblock	---	---	---	None	Low	Low
Fairpoint	---	---	---	None	High	Moderate
Kaymine	---	---	---	None	Low	Low
Gr:						
Grigsby	---	---	---	None	Low	Low
HaC:						
Hayter	---	---	---	None	Moderate	Moderate
Grigsby	---	---	---	None	Low	Low
HnF:						
Hazleton	---	---	---	None	Low	High
Shelocta	Bedrock (paralithic)	40-60	Strongly cemented	None	Low	High
Fedscreek	---	---	---	None	Low	Moderate

Table 18.—Soil Features—Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness		Uncoated steel	Concrete
		In				
Ho:						
Holly	---	---	---	None	High	Moderate
MaF:						
Marrowbone	Bedrock (lithic)	20-40	Very strongly cemented	None	Low	Moderate
Blairton	Bedrock (paralithic)	20-40	Moderately cemented	None	High	High
Dekalb	Bedrock (lithic)	20-40	Indurated	None	Low	High
NeD:						
Nelse	---	---	---	None	Low	Moderate
Or:						
Orrville	---	---	---	None	High	Moderate
RaF:						
Rayne	Bedrock (paralithic)	40-60	Moderately cemented	None	High	High
Marrowbone	Bedrock (lithic)	20-40	Very strongly cemented	None	Low	Moderate
Dekalb	Bedrock (lithic)	20-40	Indurated	None	Low	High
RoF:						
Rigley	---	---	---	None	Low	High
Rock outcrop.						
SeE:						
Shelocta	Bedrock (paralithic)	40-60	Strongly cemented	None	Low	High
SgC:						
Shelocta	Bedrock (paralithic)	40-60	Strongly cemented	None	Low	High
Grigsby	---	---	---	None	Low	Low
Orrville	---	---	---	None	High	Moderate
ShF:						
Shelocta	Bedrock (paralithic)	40-60	Strongly cemented	None	Low	High
Hazleton	---	---	---	None	Low	High
Fedscreek	---	---	---	None	Low	Moderate
UdC, UdF. Udorthents-Urban land						
UpC, UpD, UpF:						
Upshur	Bedrock (paralithic)	40-60	Strongly cemented	None	High	Moderate
Rarden	Bedrock (paralithic)	20-40	Strongly cemented	None	High	High

Table 18.—Soil Features—Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness		Uncoated steel	Concrete
		In				
VaF, VaF2:						
Vandalia	---	---	---	None	High	Moderate
Beech	---	---	---	None	Moderate	Moderate
W. Water						

Table 19.—Classification of the Soils

Soil name	Family or higher taxonomic class
Allegheny	Fine-loamy, mixed, mesic Typic Hapludults
Beech	Fine-loamy, mixed, mesic Oxyaquic Hapludalfs
Blairton	Fine-loamy, mixed, mesic Aquic Hapludults
Chagrin	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Cloverlick	Loamy-skeletal, mixed, mesic Umbric Dystrochrepts
Cotaco	Fine-loamy, mixed, mesic Aquic Hapludults
Cruze	Clayey, mixed, mesic Aquic Hapludults
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Fairpoint	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Fedscreek	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Fiveblock	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Grigsby	Coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Hayter	Fine-loamy, mixed, mesic Ultic Hapludalfs
Hazleton	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Holly	Fine-loamy, mixed, nonacid, mesic Typic Fluvaquents
Kaymine	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Marrowbone	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Nelse	Coarse-loamy, mixed, nonacid, mesic Mollic Udifluvents
Orrville	Fine-loamy, mixed, nonacid, mesic Aeric Fluvaquents
Rarden	Fine, mixed, mesic Aquulitic Hapludalfs
Rayne	Fine-loamy, mixed, mesic Typic Hapludults
Rigley	Coarse-loamy, mixed, mesic Typic Hapludults
Shelocta	Fine-loamy, mixed, mesic Typic Hapludults
Upshur	Fine, mixed, mesic Typic Hapludalfs
Vandalia	Fine, mixed, mesic Typic Hapludalfs

Table 20.—Geologic Systems, Series, Formations, and Members

System	Series	Formation	Member	Dominant soils
Quaternary	Holocene	---	Alluvium	Chagrin Grigsby Holly Nelse Orrville
Tertiary and Quaternary	Pliocene and Pleistocene	---	High-level fluvial deposits	Allegheny Cotaco
Pennsylvanian	Upper Pennsylvanian	Monongahela and Conemaugh	---	Beech Hayter Rarden Upshur Vandalia
	Upper, Middle, and Lower Pennsylvanian	Breathitt	---	Blairton Cloverlick Cruze Dekalb Fairpoint Fedscreek Fiveblock Hazleton Kaymine Marrowbone Rayne Shelocta
		Lee	---	Rigley

Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

Nondiscrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the basis of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, whether all or part of an individual's income is derived from any public assistance program, or protected genetic information. The Department prohibits discrimination in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

All Other Inquires

For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).

83° 00' 00"

82° 30' 00"

38° 15' 00"

37° 45' 00"

N

1 BOLTSFORK
2 BURNAUGH
3 WILLARD
4 WEBBVILLE
5 FALLSBURG
6 PRICHARD
7 ISONVILLE
8 MAZIE
9 BLAINE
10 ADAMS
11 LOUISA
12 DINGUS
13 REDBUSH
14 SITKA
15 RICHARDSON
16 MILO
17 WEBB
18 OFFUTT
19 INEZ
20 KERMIT
21 NAUGATUCK
22 LANCER
23 THOMAS
24 VARNEY
25 WILLIAMSON

COUNTY
BOYD
CARTER
ELLIOTT
MORGAN
JOHNSON
WAYNE
LAWRENCE
MARTIN
FLOYD
PIKE
WEST VIRGINIA
OHIO
CHESAPEAKE AND
Louisa
Blaine
Inez
Warfield

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

INDEX TO MAP SHEETS
LAWRENCE AND MARTIN COUNTIES, KENTUCKY

1 0 1 2 3
MILES

1 0 1 2 3 4 5 6
KILOMETERS

SCALE = 1:175000

SOIL LEGEND

Map symbols consist of a combination of letters and a *number*. The first two letters represent the kind of soil. A capital letter following these letters indicates the class of slope. Symbols without a slope letter are for nearly level soils or for miscellaneous areas. A final number of 2 indicates that the soil is eroded.

SYMBOL	NAME
AaB	Allegheny loam, 2 to 6 percent slopes
AaC	Allegheny loam, 6 to 15 percent slopes
AbB	Allegheny loam, 2 to 6 percent slopes, rarely flooded
AbC	Allegheny loam, 6 to 15 percent slopes, rarely flooded
AeB	Allegheny loam, 2 to 6 percent slopes, occasionally flooded
BlC	Blairton-Cruze-Marrowbone complex, 6 to 12 percent slopes
BlD	Blairton-Cruze-Marrowbone complex, 12 to 25 percent slopes
Ch	Chagrin loam, frequently flooded
ClF	Cloverlick-Hazleton-Shelocta complex, 30 to 80 percent slopes, very stony
CmB	Cotaco silt loam, 0 to 4 percent slopes
CmC	Cotaco silt loam, 4 to 12 percent slopes
CoB	Cotaco silt loam, 0 to 4 percent slopes, rarely flooded
CoC	Cotaco silt loam, 4 to 12 percent slopes, rarely flooded
CtB	Cotaco silt loam, 0 to 4 percent slopes, occasionally flooded
DAM	Dams, large
Dm	Dumps, mine; tailings; and tipples
FiB	Fiveblock, Fairpoint, and Kaymine soils, 0 to 6 percent slopes, stony
FiD	Fiveblock, Fairpoint, and Kaymine soils, 6 to 30 percent slopes, stony
FiF	Fiveblock, Fairpoint, and Kaymine soils, 30 to 80 percent slopes, stony
Gr	Grigsby fine sandy loam, frequently flooded
HaC	Hayter-Grigsby complex, 2 to 15 percent slopes
HnF	Hazleton-Shelocta-Fedscreek complex, 30 to 80 percent slopes, very stony
Ho	Holly silt loam, frequently flooded
MaF	Marrowbone-Blairton-Dekalb complex, 25 to 60 percent slopes, rocky
NeD	Nelse fine sandy loam, 4 to 25 percent slopes, frequently flooded
Or	Orrville silt loam, frequently flooded
RaF	Rayne-Marrowbone-Dekalb complex, 20 to 80 percent slopes, very rocky
RoF	Rigley-Rock outcrop complex, 30 to 70 percent slopes
SeE	Shelocta silt loam, 12 to 30 percent slopes
SgC	Shelocta-Grigsby-Orrville complex, 2 to 15 percent slopes
ShF	Shelocta-Hazleton-Fedscreek complex, 30 to 60 percent slopes, stony
UdC	Udorthents-Urban land complex, 0 to 12 percent slopes
UdF	Udorthents-Urban land complex, 0 to 80 percent slopes, benched
UpC	Upshur-Rarden complex, 6 to 12 percent slopes
UpD	Upshur-Rarden complex, 12 to 25 percent slopes
UpF	Upshur-Rarden complex, 25 to 60 percent slopes, rocky
VaF	Vandalia-Beech complex, 20 to 60 percent slopes, stony
VaF2	Vandalia-Beech complex, 20 to 60 percent slopes, stony, eroded
W	Water

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park)
- Land grant
- Limit of soil survey (label) and/or denied access area
- Field sheet matchline & neatline
- Previously Published Survey

OTHER BOUNDARY (label)

- Airport, airfield
- Cemetery
- City/county park

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(section and land grants)

GEOGRAPHIC COORDINATE TICK

TRANSPORTATION

- Divided roads
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate (173, 79, 245)
- Federal (287, 410, 224)
- State (52, 52, 347)
- County, farm or ranch (1283)

RAILROAD

POWER TRANSMISSION LINE
(normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

Single side slope
(showing actual feature location)

DAMS

- Medium or Small

LANDFORM FEATURES

- Prominent hill or peak
- Soil Sample Site

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Other Religion (label) (Mt Carmel)
- Located object (label) (Ranger Station)
- Tank (label) (Petroleum)
- Lookout Tower
- Oil and/or Natural Gas Wells
- Windmill
- Lighthouse

HYDROGRAPHIC FEATURES

STREAMS

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end

DRAINAGE AND IRRIGATION

- Double-line canal (label) (CANAL)
- Perennial drainage and/or irrigation ditch
- Intermittent drainage and/ or irrigation ditch

SMALL LAKES, PONDS AND RESERVOIRS

- Perennial water
- Miscellaneous water
- Flood pool line (FLOOD POOL LINE)

MISCELLANEOUS WATER FEATURES

- Spring
- Well, artesian
- Well, irrigation

SPECIAL SYMBOLS FOR SOIL SURVEY AND SSURGO

SOIL DELINEATIONS AND SYMBOLS (AaB, CmB)

LANDFORM FEATURES

ESCARPMENTS

- Bedrock
- Other than bedrock

SHORT STEEP SLOPE

GULLY

DEPRESSION, closed

SINKHOLE

EXCAVATIONS

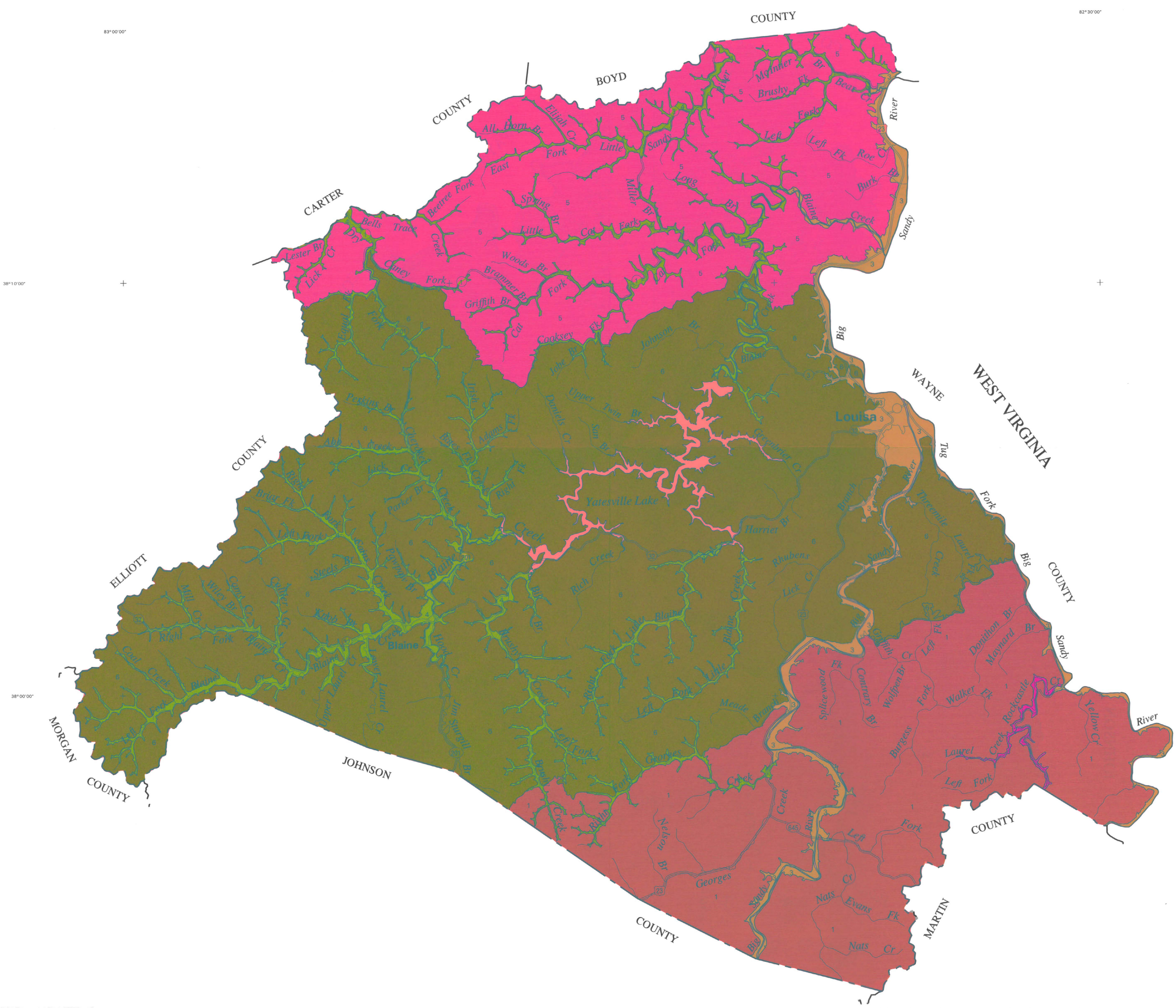
PITS

- Borrow pits
- Gravel pit
- Mine or quarry

LANDFILL

MISCELLANEOUS SURFACE FEATURES

- Blowout
- Clay spot
- Gravelly spot
- Lava flow
- Marsh or swamp
- Rock outcrop
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip
- Sodic spot
- Spoil area
- Stony spot
- Very stony spot
- Wet spot



LEGEND

1	Hazleton-Shelocta-Fiveblock
2	Udorthents-Grigsby-Shelocta
3	Udorthents-Nelse-Allegheny
4	Grigsby-Shelocta-Orrville
5	Upshur-Vandalia-Rarden
6	Shelocta-Hazleton-Blairton

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
KENTUCKY NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
KENTUCKY ARICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
LAWRENCE COUNTY, KENTUCKY

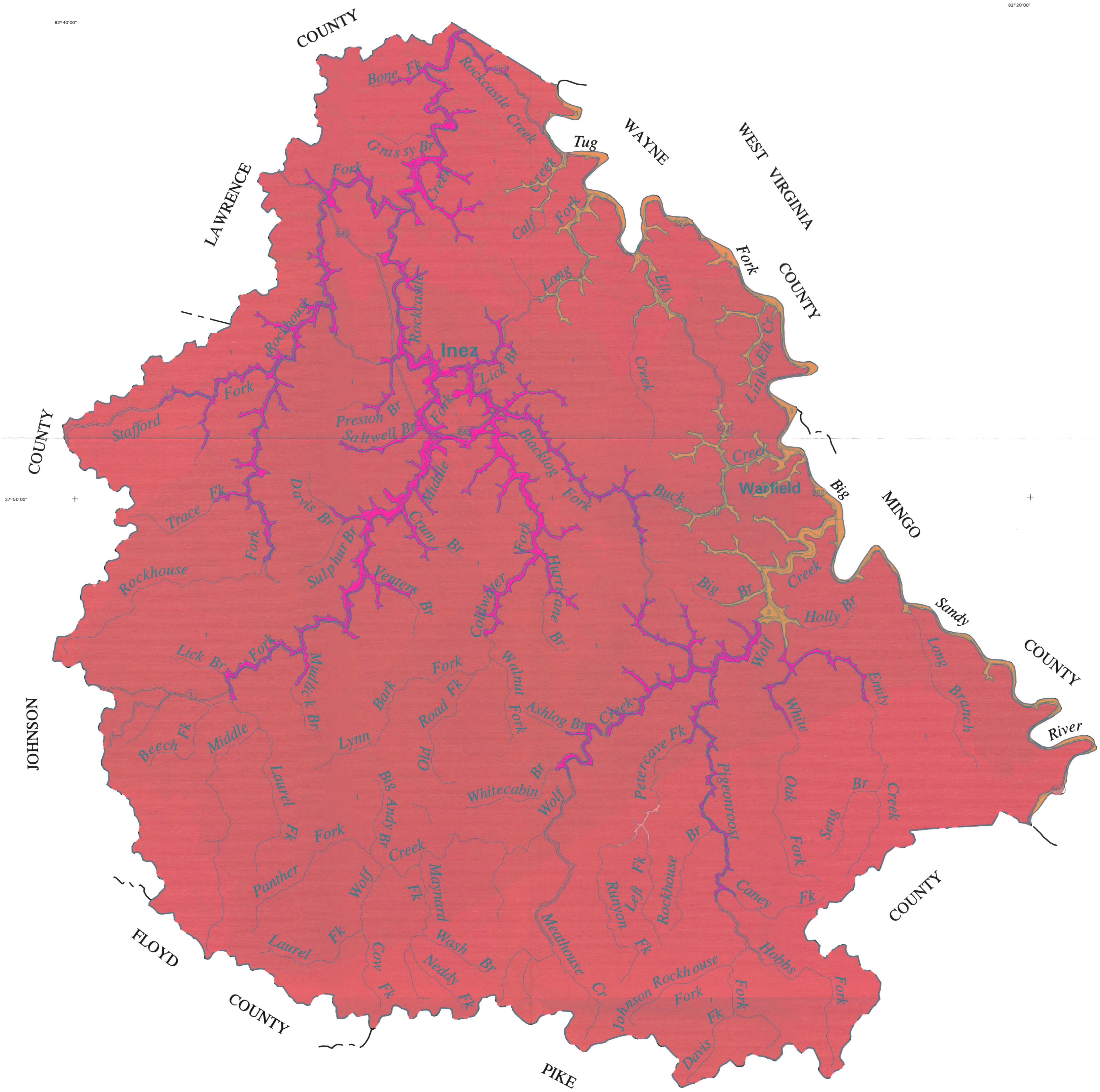
1 0 1 2 3
MILES

1 0 1 2 3 4 5 6
KILOMETERS

SCALE = 1:110000

N

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



82° 40'00"
82° 20'00"
37°50'00"
LAWRENCE COUNTY
WAYNE
WEST VIRGINIA
COUNTY
MINGO COUNTY
JOHNSON COUNTY
FLOYD COUNTY
PIKE COUNTY
Tug Fork
Big Sandy River
Inez
Warfield
Bone Fk
Rockcastle Creek
Grassy Br
Fork
Creek
Calf Fork
Long
Elk Creek
Little Elk Cr
Rockhouse Fork
Rockcastle
Lick Br
Preston Br
Saltwell Br
Fork
Stafford
Blacklog Fork
Buck Creek
Trace Fk
Davis Br
Middle
Crum Br
Fork
Rockhouse
Sulphur Br
Venters Br
Coldwater
Fork
Hurricane Br
Big Br
Creek
Holly Br
Lick Br
Fork
Middick Br
Fork
Bark
Road Fk
Walnut Fork
Ashlog Br
Creek
Wolf
White
Emily
Long Branch
Beech Fk
Middle
Lynn
Old
Petercave Fk
Pigeonroost
Laurel Fk
Big Andy Br
Whitecabin
Br
Wolf
Oak Fork
Seng Br
Creek
Fork
Creek
Panther
Wolf
Fk
Maynard
Runyon
Left Fk
Rockhouse
Br
Caney Fk
Laurel Fk
Cow Fk
Wash Br
Neddy Fk
Meathouse Cr
Johnson Rockhouse Fork
Fk
Fork
Hobbs Fork
Davis
645
40
3
292
2031

LEGEND

1	Hazleton-Shelocta-Fiveblock
2	Udorthents-Grigsby-Shelocta
3	Udorthents-Nelse-Allegheny

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
KENTUCKY NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
KENTUCKY ARICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
MARTIN COUNTY, KENTUCKY

N

1 0 1 2 3
MILES

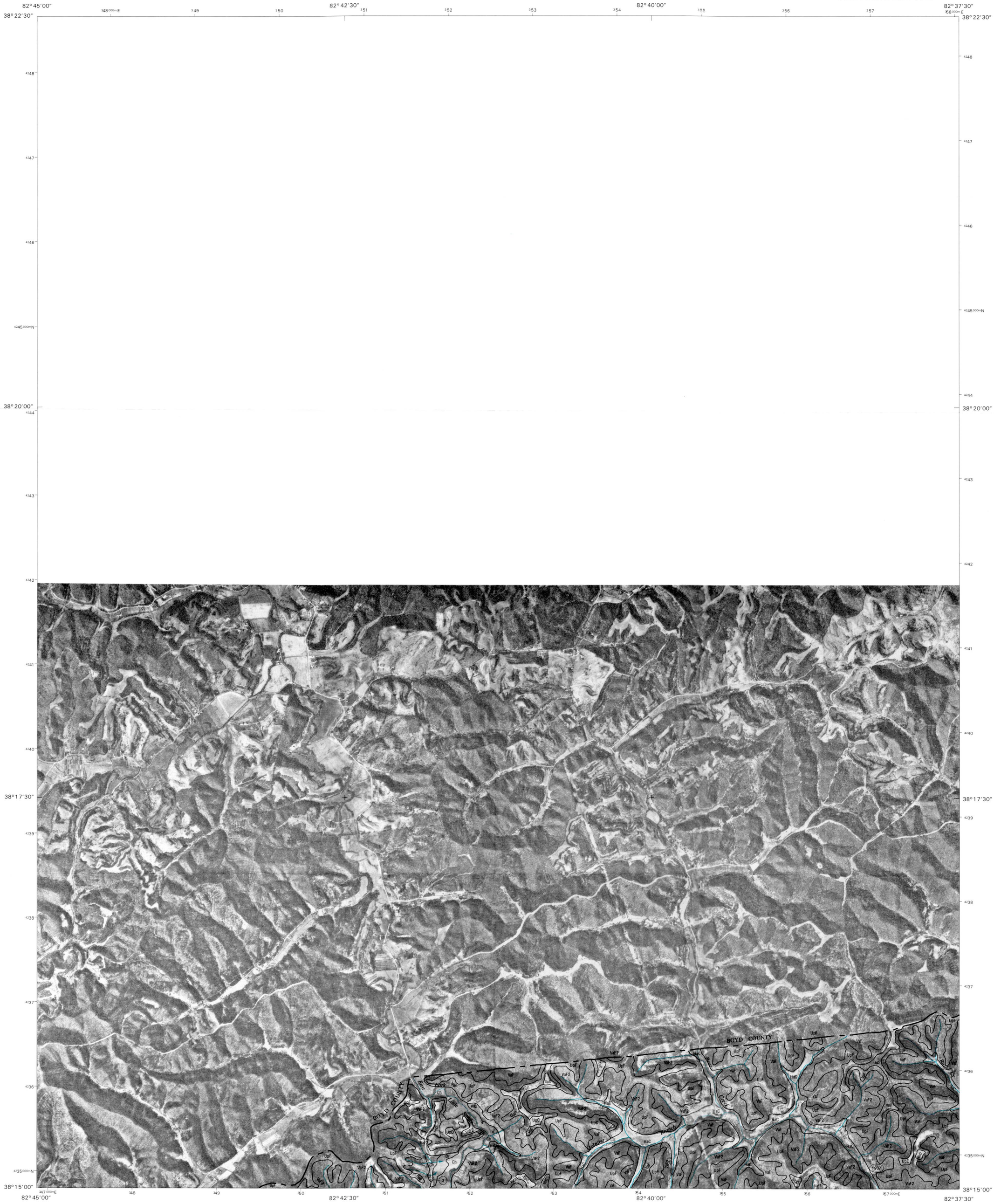
1 0 1 2 3 4 5 6
KILOMETERS

SCALE = 1:75000

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
BOLTSFORK QUADRANGLE
SHEET NUMBER 1 OF 25



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service
Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000 - meter ticks: Universal Transverse Mercator, zone 17.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

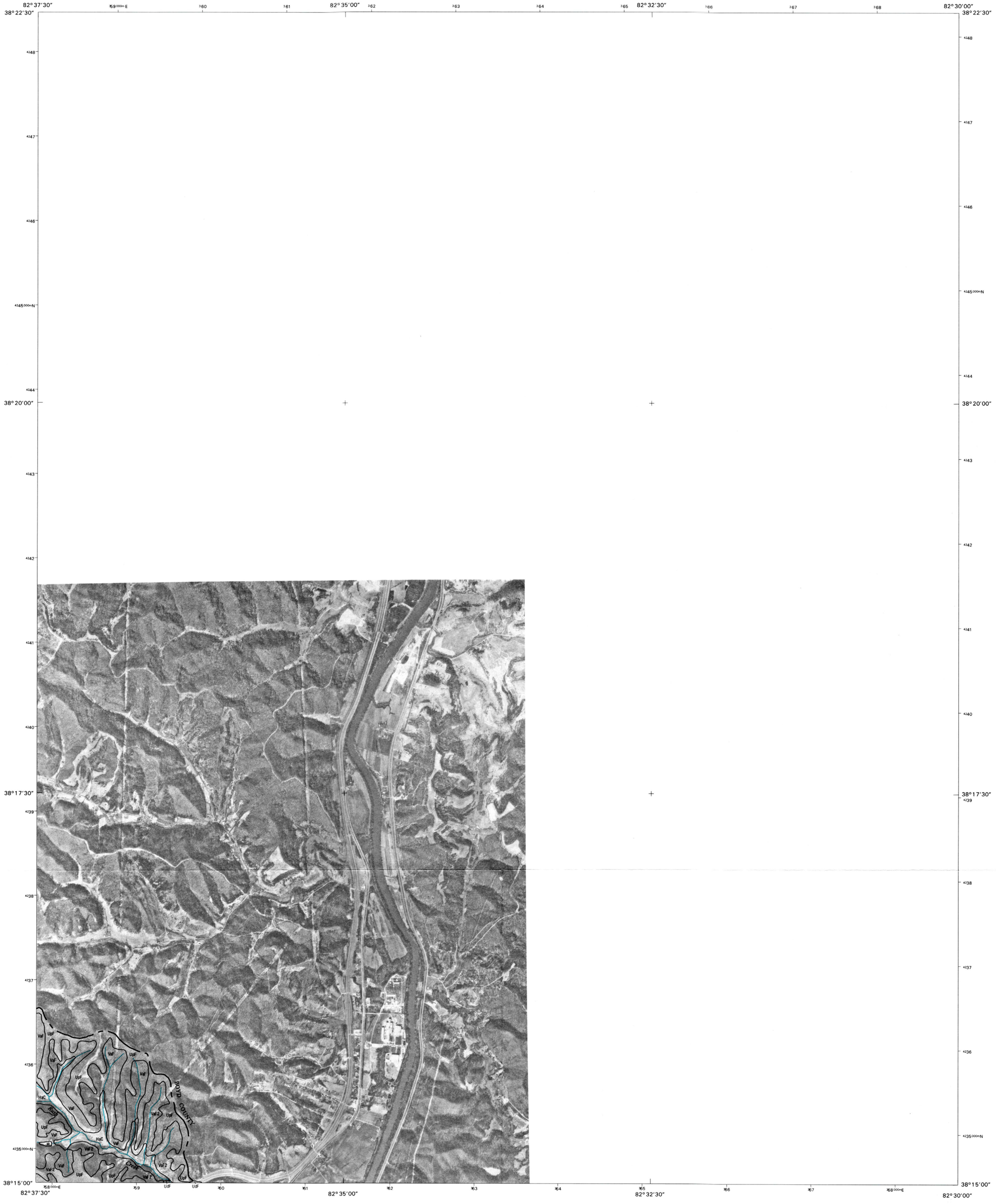
1	2	3	1 ARGILLITE 2 ASHLAND 3 CATLETTSBURG
4		5	4 RUSH 5 BURNAUGH
6	7	8	6 WEBBVILLE 7 FALLSBURG 8 PRICHARD

INDEX TO ADJOINING 7.5 MAPS

BOLTSFORK, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 1 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
BURNAUGH QUADRANGLE
SHEET NUMBER 2 OF 25



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000 - meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

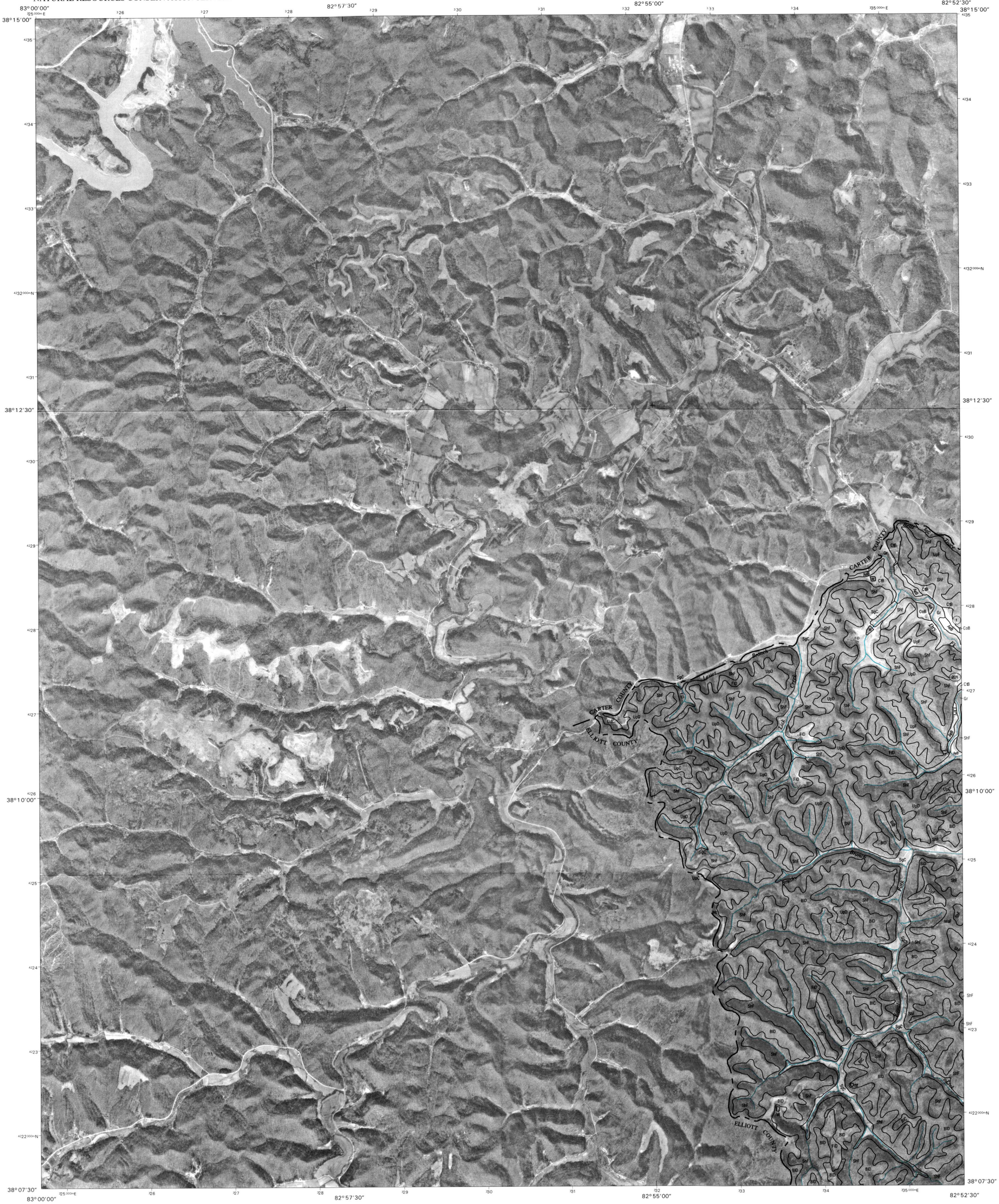
1	2	3	1 ASHLAND 2 CATLETTSBURG 3 HUNTINGTON 4 BOLTSFORK 5 LAVALETTE 6 FALLSBURG 7 PRICHARD 8 WAYNE
4		5	
6	7	8	

INDEX TO ADJOINING 7.5 MAPS

BURNAUGH, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 2 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
WILLARD QUADRANGLE
SHEET NUMBER 3 OF 25



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000 - meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

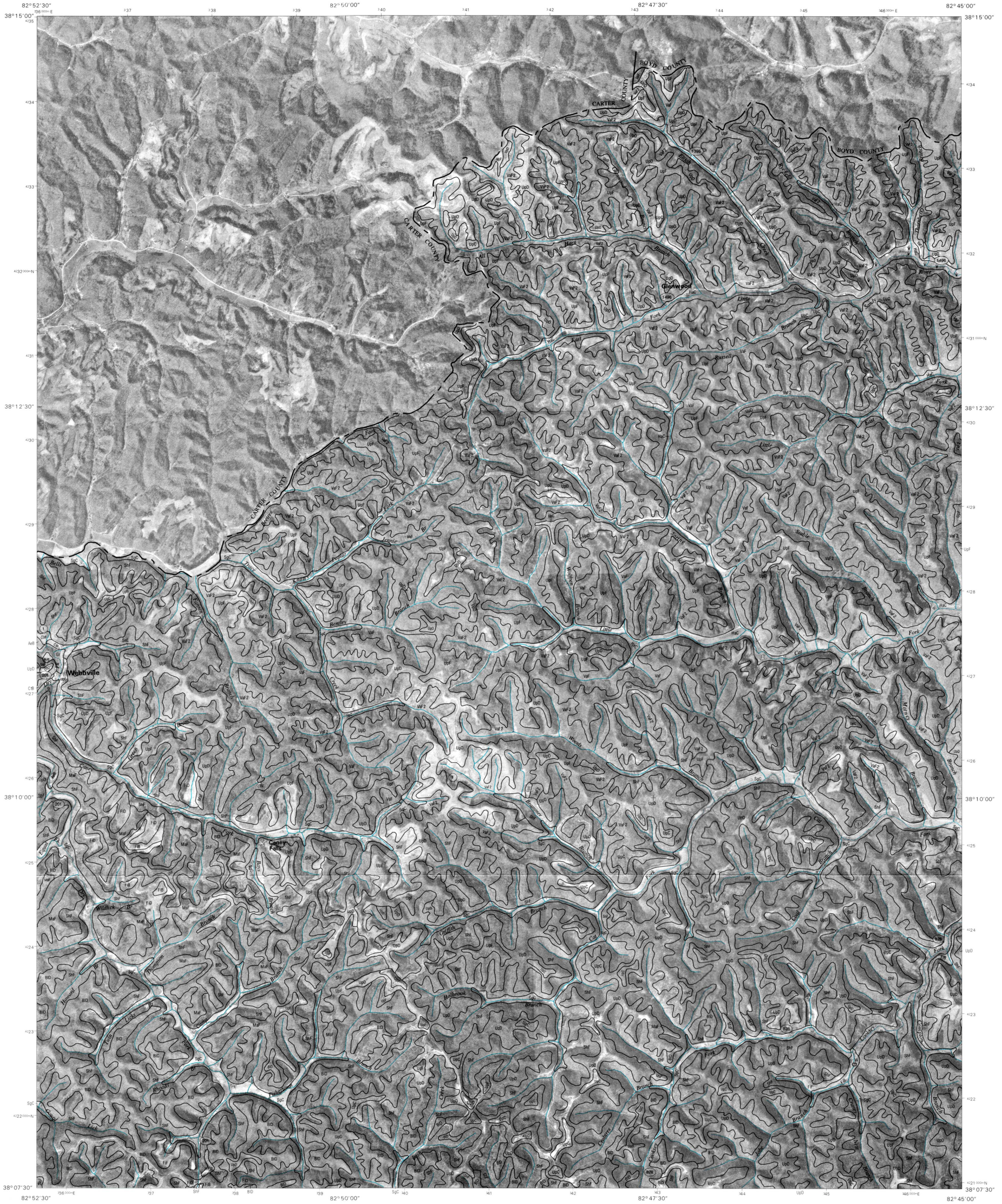
1	2	3	1 GRAHN 2 GRAYSON 3 RUSH
4		5	4 BRUIN 5 WEBBVILLE
6	7	8	6 ISONVILLE 7 MAZIE 8 BLAINE

INDEX TO ADJOINING 7.5 MAPS

WILLARD, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 3 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
WEBBVILLE QUADRANGLE
SHEET NUMBER 4 OF 25



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service
Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000 - meter ticks: Universal Transverse Mercator, zone 17.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

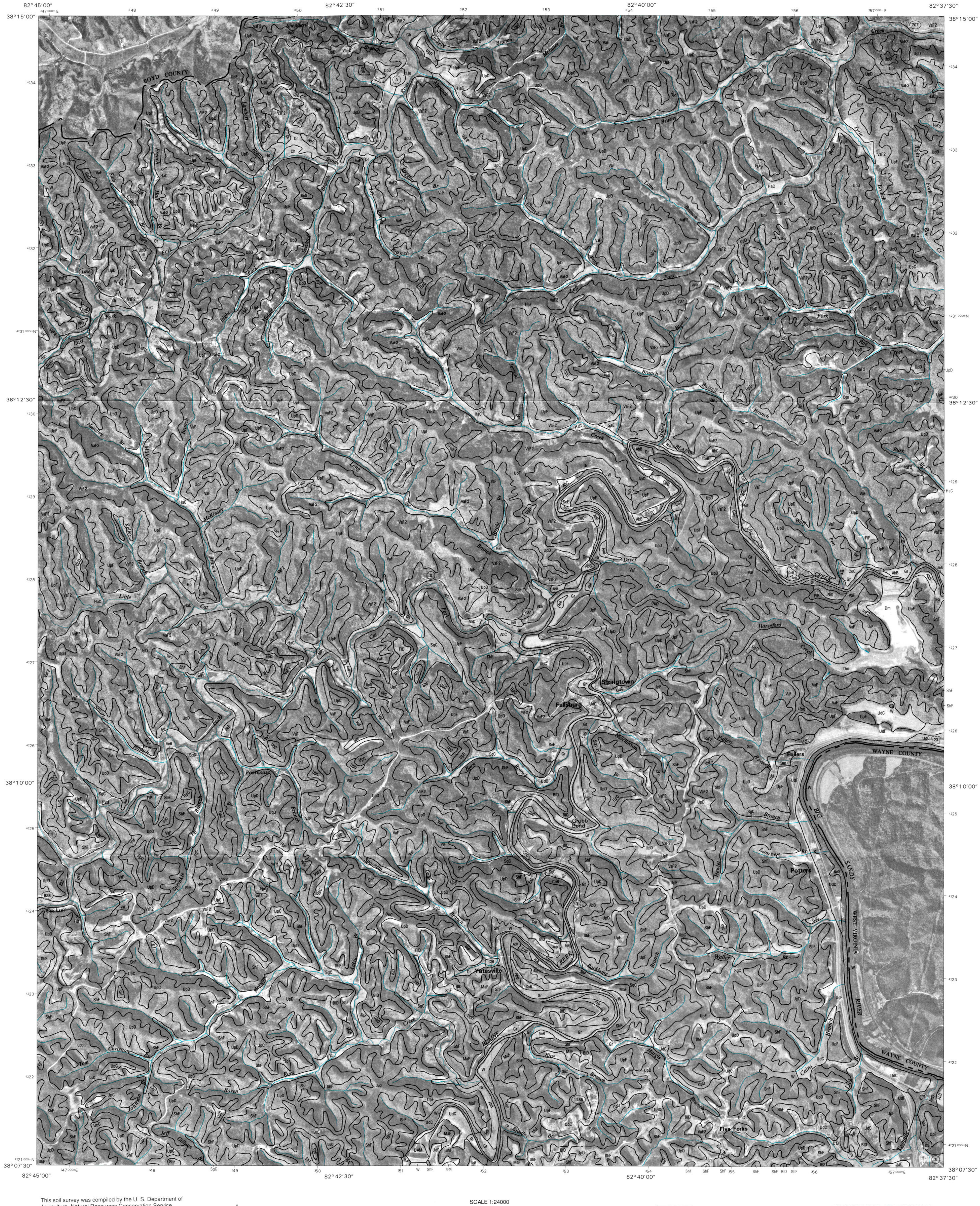
KILOMETERS

1	2	3
4		5
6	7	8

1 GRAYSON
2 RUSH
3 BOLTSFORK
4 WILLARD
5 FALLSBURG
6 MAZIE
7 BLAINE
8 ADAMS

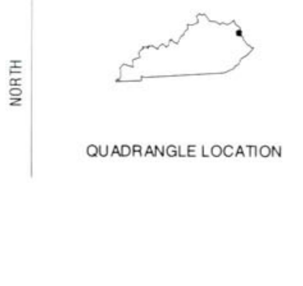
INDEX TO ADJOINING 7.5 MAPS

WEBBVILLE, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 4 OF 25



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000 - meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



SCALE 1:24000

MILES

FEET

KILOMETERS

INDEX TO ADJOINING 7.5 MAPS

1 RUSH
2 BOLTSFORK
3 BURNAUGH
4 WEBBVILLE
5 PRICHARD
6 BLAINE
7 ADAMS
8 LOUISA

FALLSBURG, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 5 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
PRICHARD QUADRANGLE
SHEET NUMBER 6 OF 25

This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000 - meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

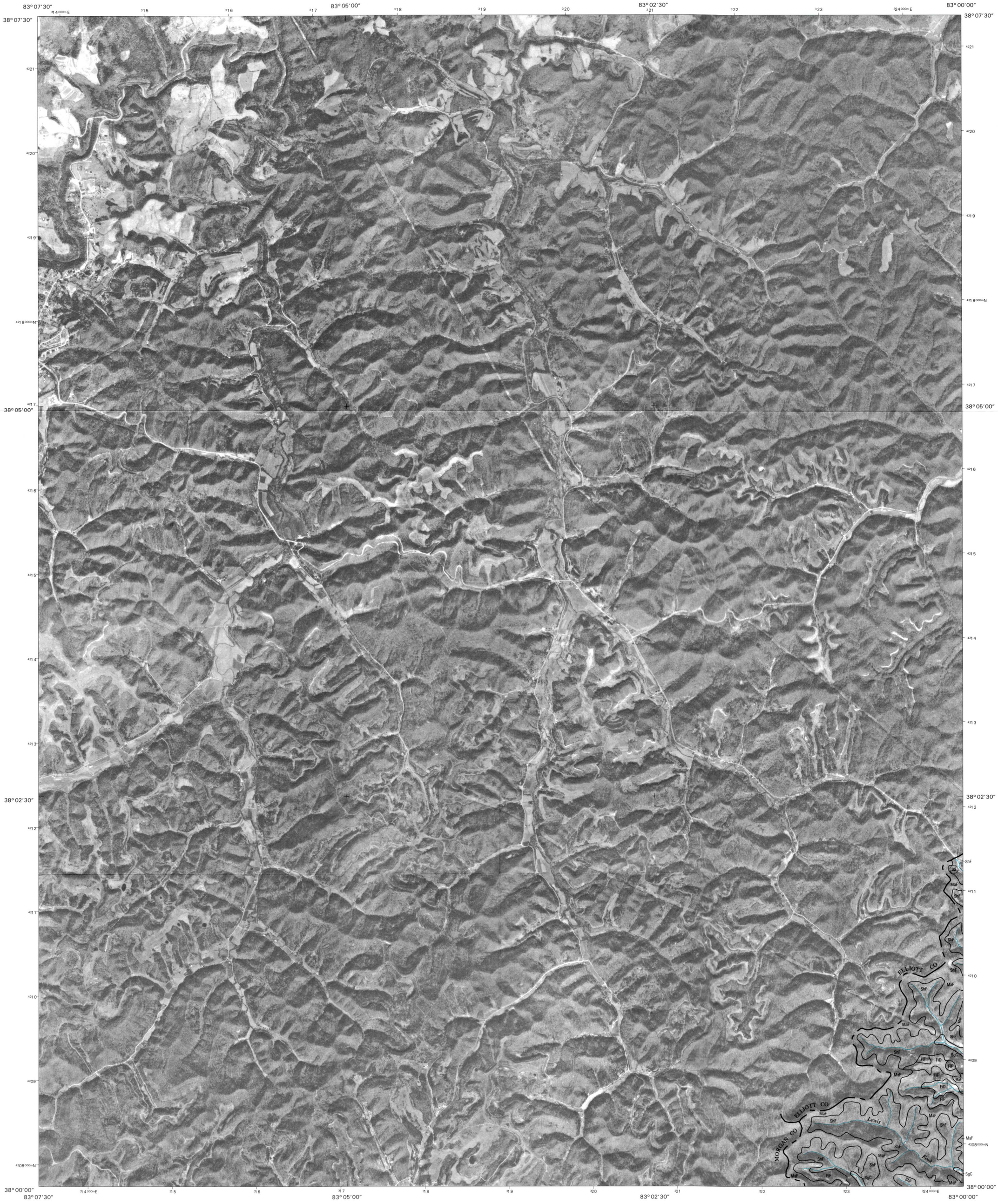
INDEX TO ADJOINING 7.5 MAPS

1	2	3	1 BOLTSFORK 2 BURNAUGH 3 LAVALETTE
4		5	4 FALLSBURG 5 WAYNE
6	7	8	6 ADAMS 7 LOUISA 8 RADNOR

PRICHARD, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 6 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
ISONVILLE QUADRANGLE
SHEET NUMBER 7 OF 25



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000 - meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES 1 0 1

FEET 1000 0 1000 2000 3000 4000 5000 6000 7000

KILOMETERS 1 0 1

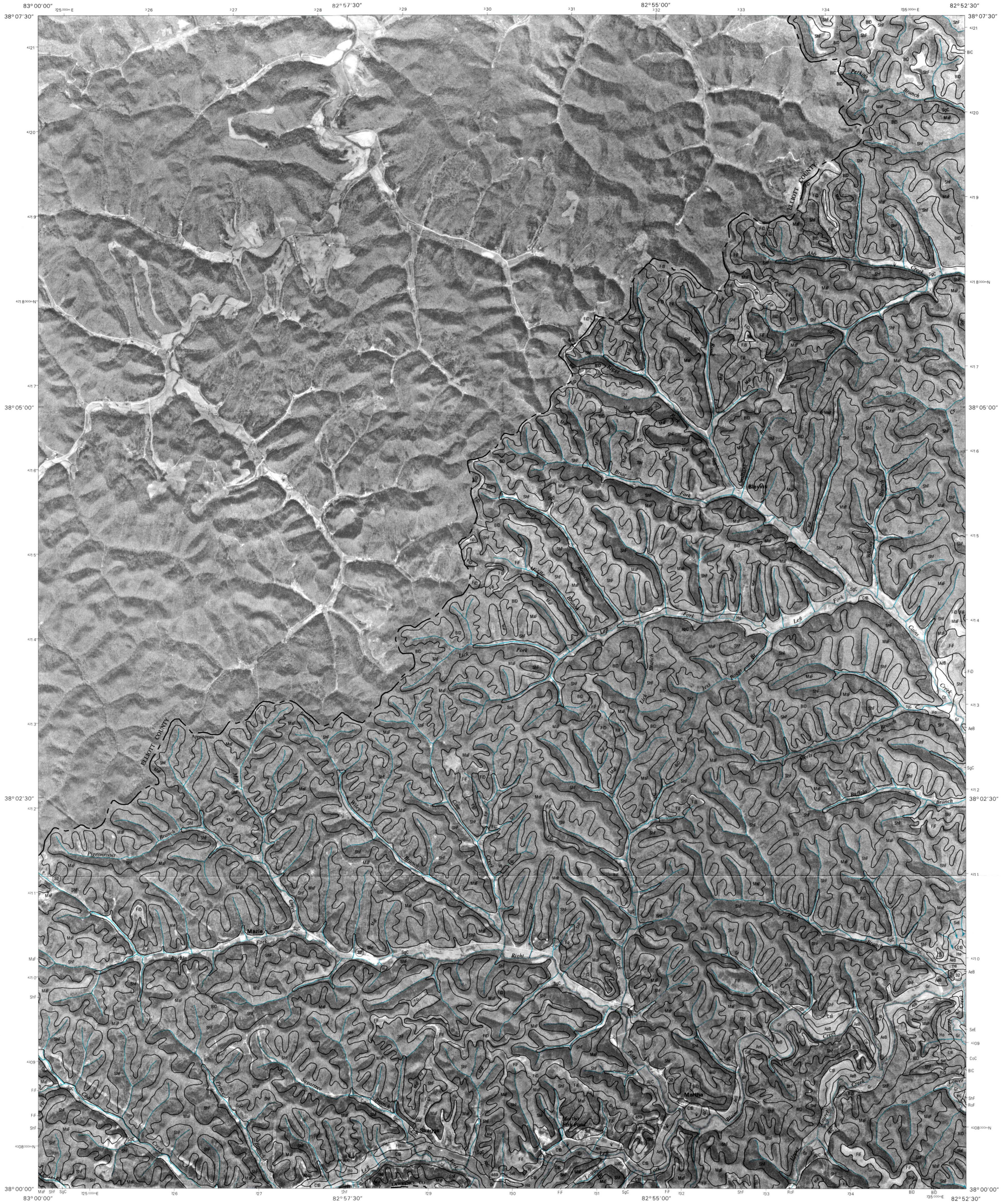
1	2	3	1 AULT
4		5	2 BRUIN
6	7	8	3 WILLARD
			4 SANDY HOOK
			5 MAZIE
			6 LENOX
			7 DINGUS
			8 REDBUSH

INDEX TO ADJOINING 7.5 MAPS

ISONVILLE, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 7 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
MAZIE QUADRANGLE
SHEET NUMBER 8 OF 25



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service
Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000 - meter ticks: Universal Transverse Mercator, zone 17.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

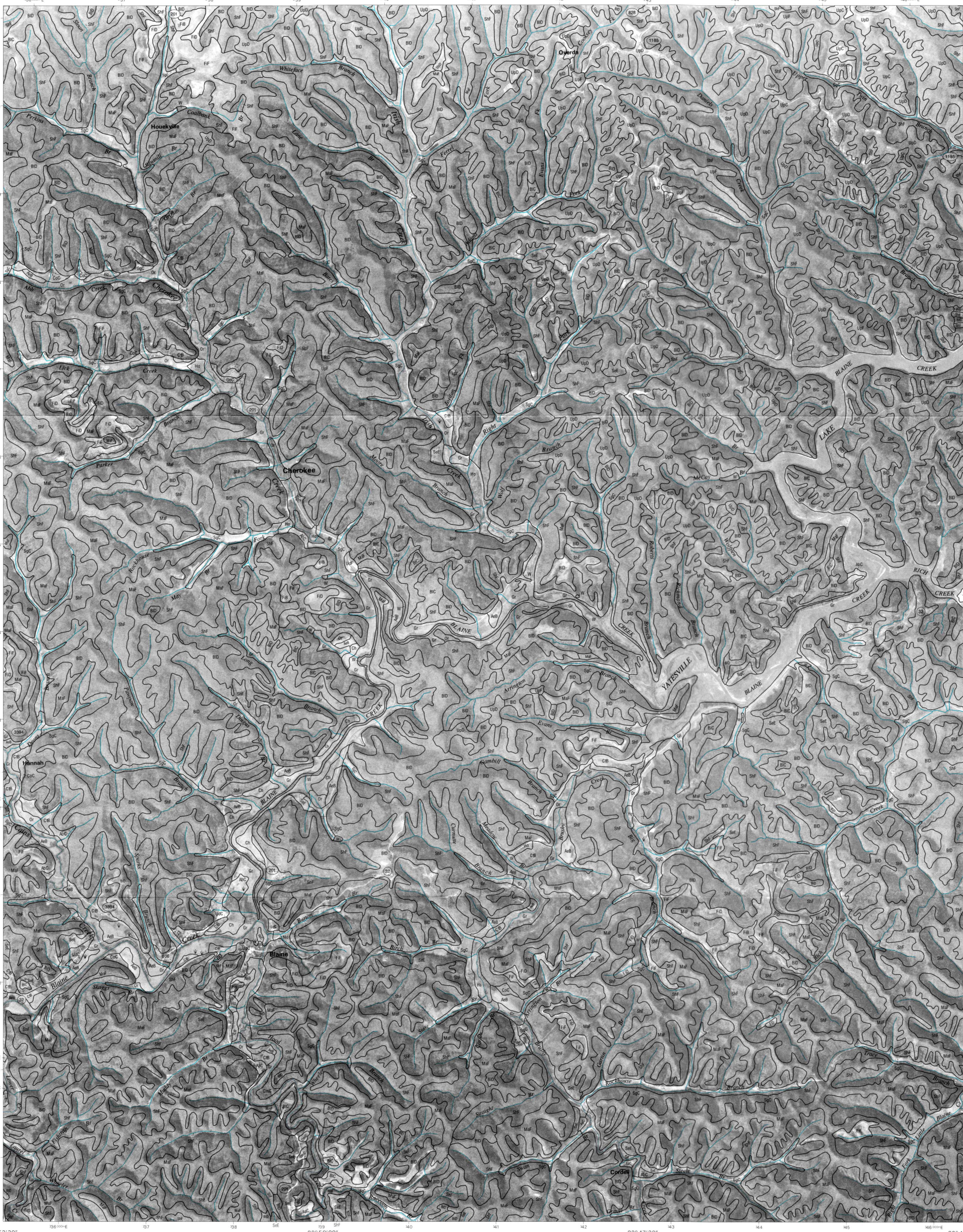
1 BRUIN
2 WILLARD
3 WEBBVILLE
4 ISONVILLE
5 BLAINE
6 DINGUS
7 REDBUSH
8 SITKA

INDEX TO ADJOINING 7.5 MAPS

MAZIE, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 8 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
BLAINE QUADRANGLE
SHEET NUMBER 9 OF 25



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service
Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000 - meter ticks: Universal Transverse Mercator, zone 17.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

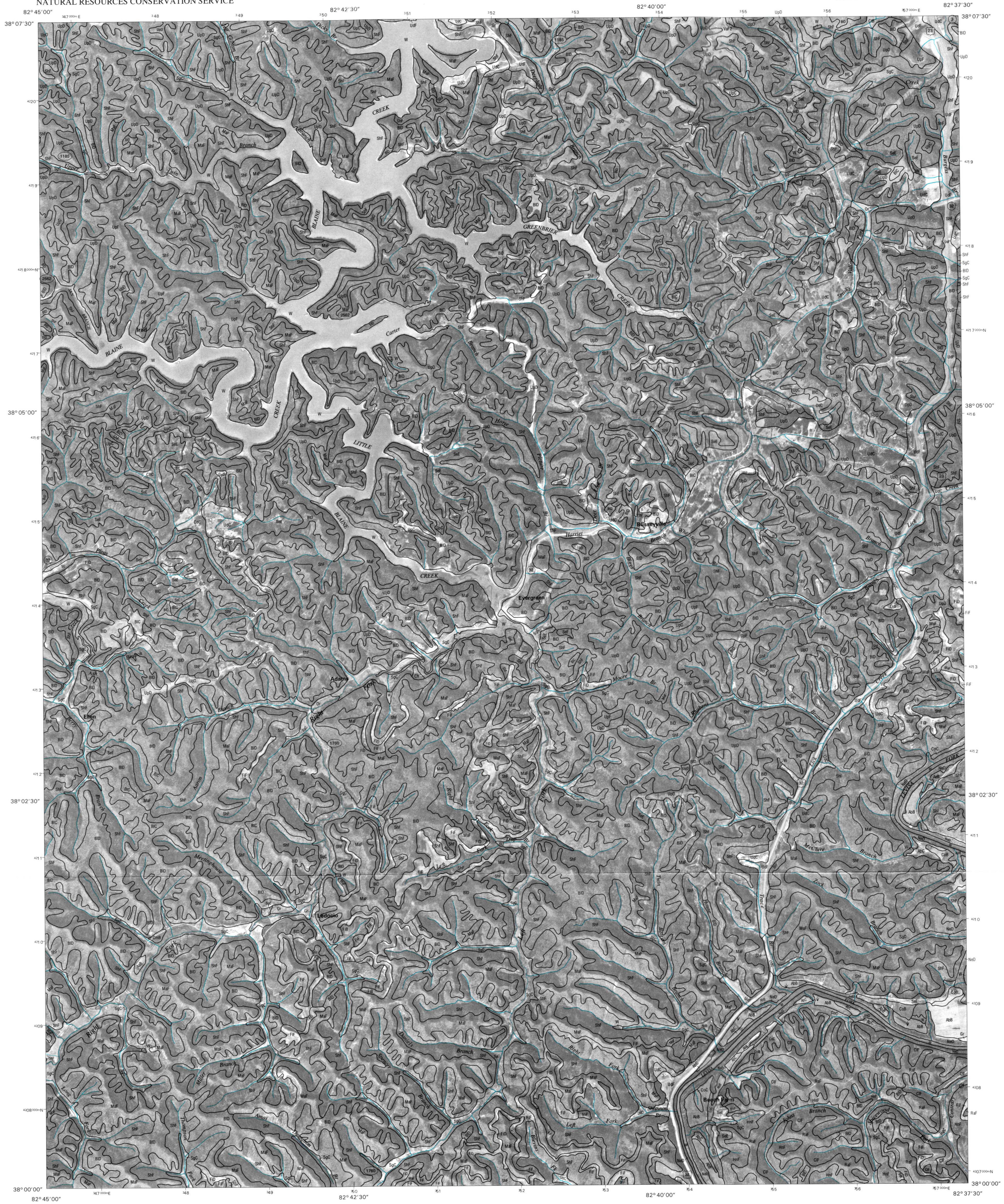
1 WILLARD
2 WEBBVILLE
3 FALLSBURG
4 MAZIE
5 ADAMS
6 REDBUSH
7 SITKA
8 RICHARDSON

INDEX TO ADJOINING 7.5 MAPS

BLAINE, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 9 OF 25

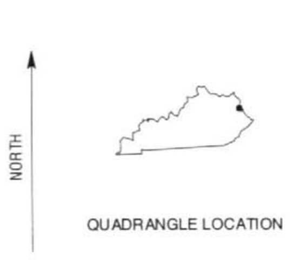
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
ADAMS QUADRANGLE
SHEET NUMBER 10 OF 25



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid. 1000 - meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



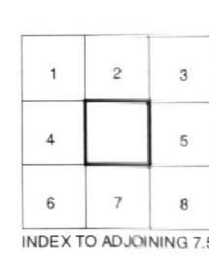
QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS



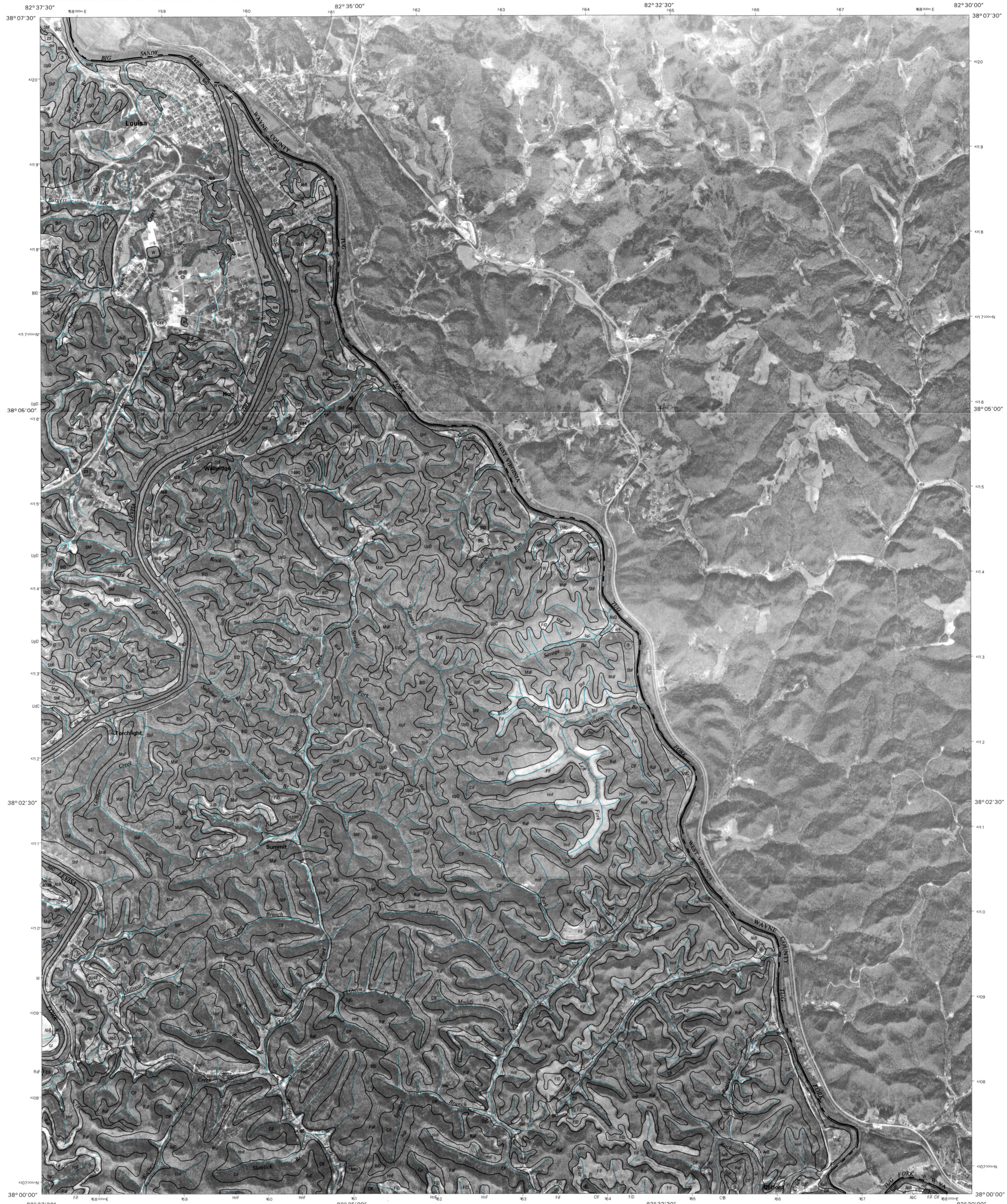
1 WEBBVILLE
2 FALLSBURG
3 PRICHARD
4 BLAINE
5 LOUISA
6 SITKA
7 RICHARDSON
8 MILO

INDEX TO ADJOINING 7.5 MAPS

ADAMS, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 10 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
LOUISA QUADRANGLE
SHEET NUMBER 11 OF 25



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000 - meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

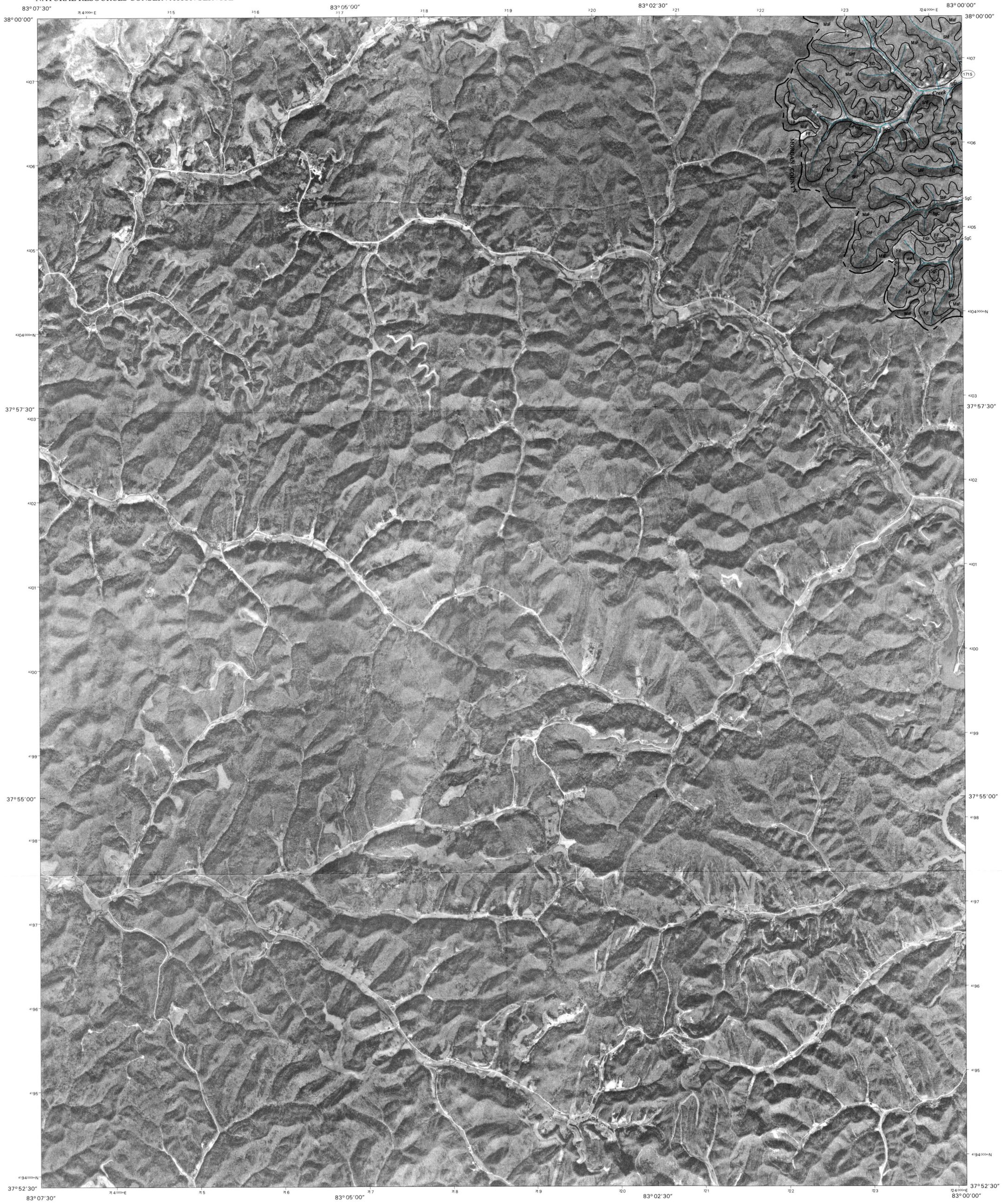
1 FALLSBURG
2 PRICHARD
3 WAYNE
4 ADAMS
5 RADNOR
6 RICHARDSON
7 MILO
8 WEBB

INDEX TO ADJOINING 7.5 MAPS

LOUISA, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 11 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
DINGUS QUADRANGLE
SHEET NUMBER 12 OF 25



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000 - meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3	1 SANDY HOOK 2 ISONVILLE 3 MAZIE
4		5	4 LENOX 5 REDBUSH 6 WHITE OAK
6	7	8	7 SALYERSVILLE NORTH 8 OIL SPRINGS

INDEX TO ADJOINING 7.5 MAPS

DINGUS, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 12 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
REDBUSH QUADRANGLE
SHEET NUMBER 13 OF 25

This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000 - meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

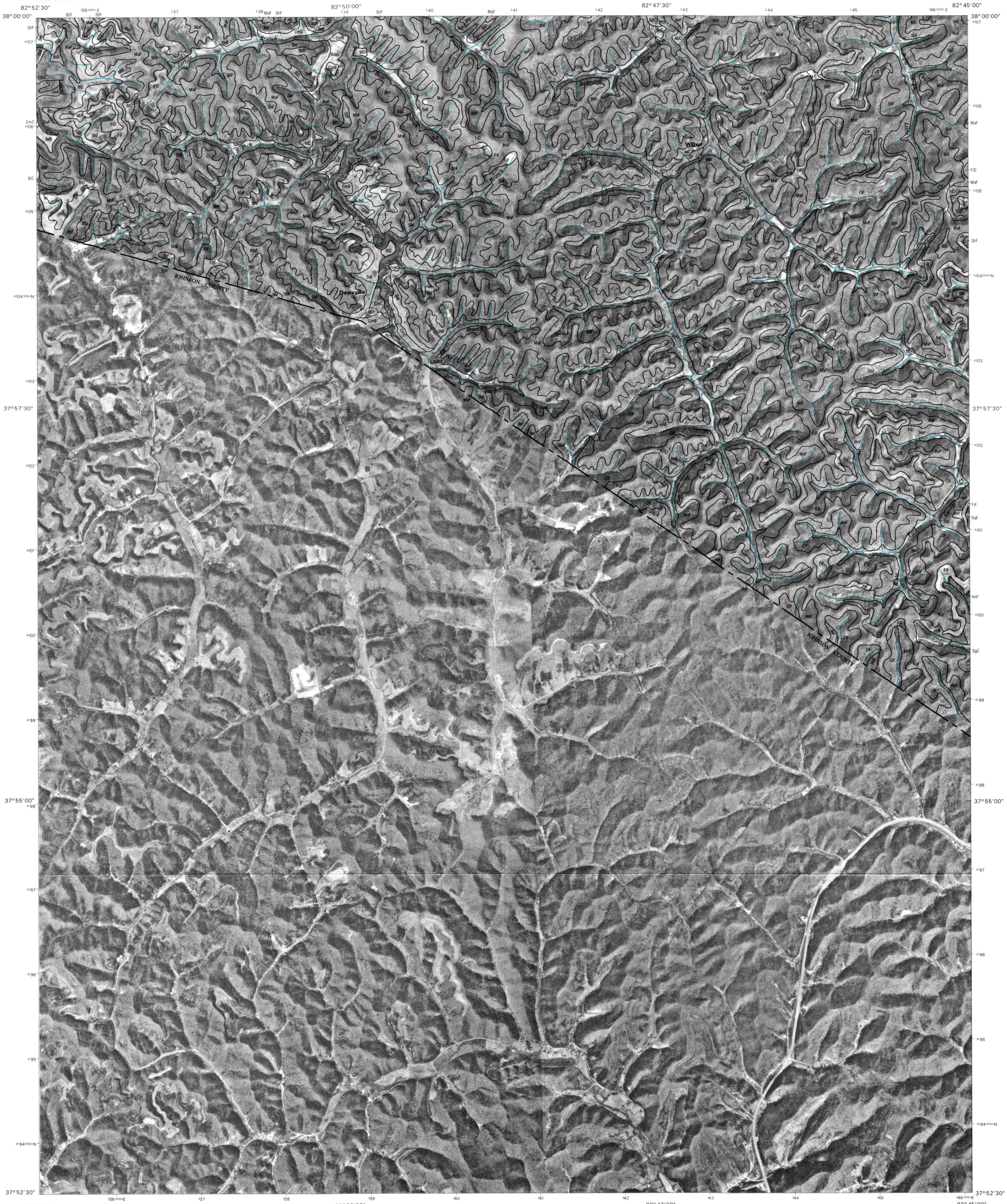
INDEX TO ADJOINING 7.5 MAPS

1 ISONVILLE
2 MAZIE
3 BLAINE
4 DINGUS
5 SITKA
6 SALYERSVILLE NORTH
7 OIL SPRINGS
8 PAINTSVILLE

REDBUSH, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 13 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
SITKA QUADRANGLE
SHEET NUMBER 14 OF 25



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service
Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000 - meter ticks: Universal Transverse Mercator, zone 17.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES: 1 0 1

FEET: 1000 0 1000 2000 3000 4000 5000 6000 7000

KILOMETERS: 1 0 1

1	2	3
4		5
6	7	8

1 MAZIE
2 BLAINE
3 ADAMS
4 REDBUSH
5 RICHARDSON
6 OIL SPRINGS
7 PAINTSVILLE
8 OFFUTT

INDEX TO ADJOINING 7.5 MAPS

SITKA, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 14 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
RICHARDSON QUADRANGLE
SHEET NUMBER 15 OF 25

This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000 - meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

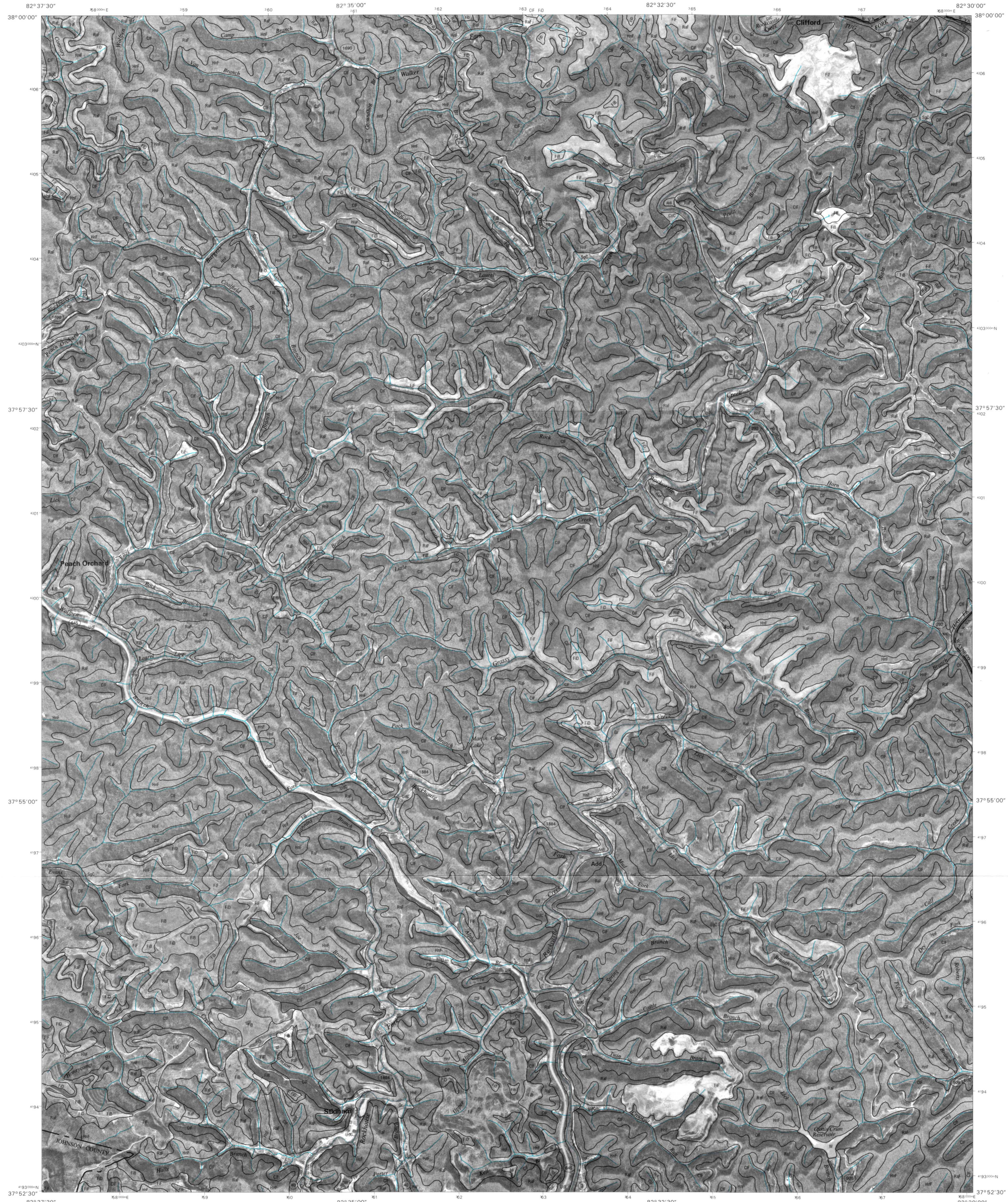
KILOMETERS

1	2	3
4		5
6	7	8

1 BLAINE
2 ADAMS
3 LOUISA
4 SITKA
5 MILO
6 PAINTSVILLE
7 OFFUTT
8 INEZ

INDEX TO ADJOINING 7.5 MAPS

RICHARDSON, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 15 OF 25



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000 - meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES 1 0 1

FEET 1000 0 1000 2000 3000 4000 5000 6000 7000

KILOMETERS 1 0 1

1	2	3
4		5
6	7	8

1 ADAMS
2 LOUISA
3 RADNOR
4 RICHARDSON
5 WEBB
6 OFFUTT
7 INEZ
8 KERMIT

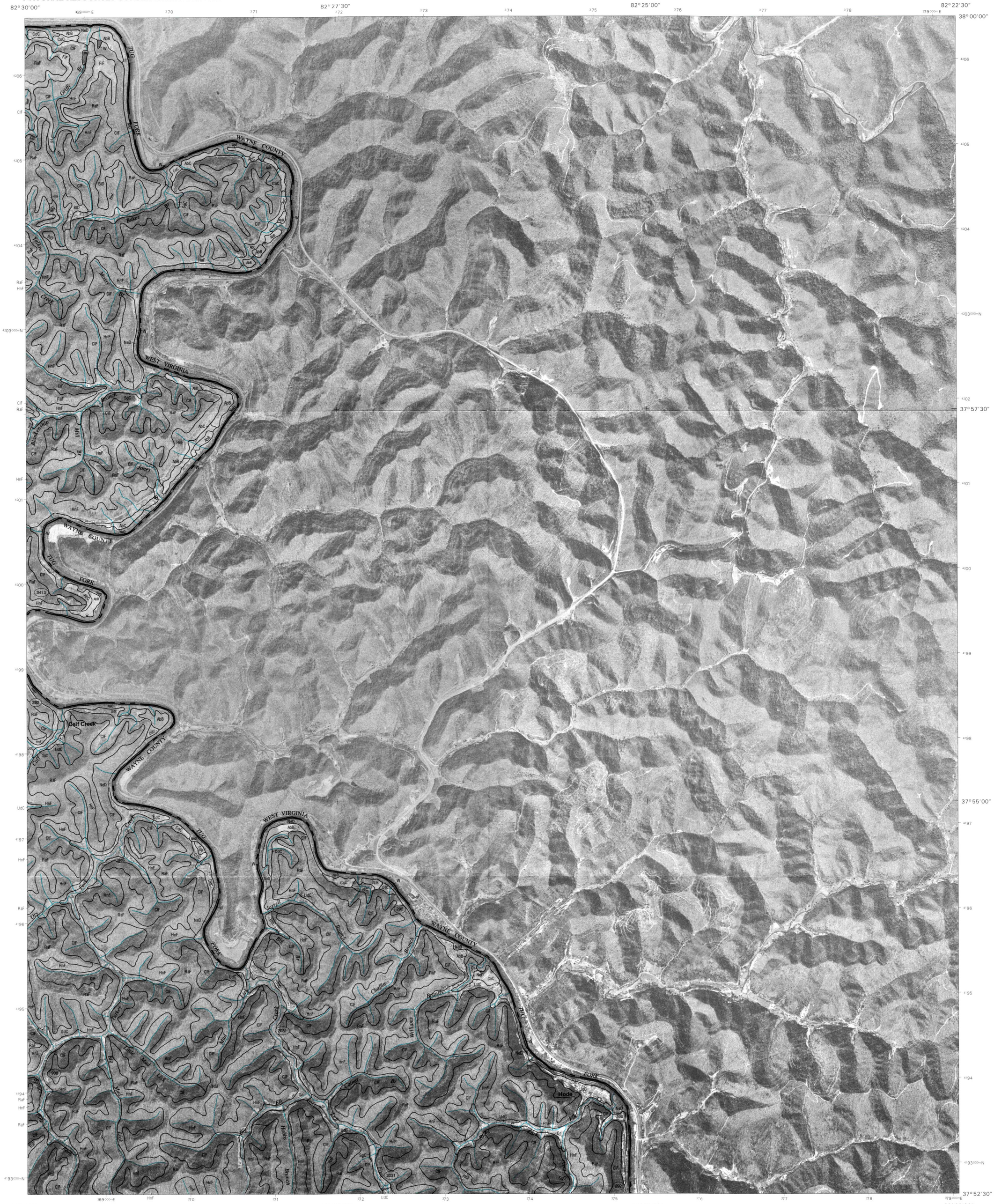
INDEX TO ADJOINING 7.5 MAPS

MILO, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 16 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
WEBB QUADRANGLE
SHEET NUMBER 17 OF 25

82°30'00" 82°27'30" 82°25'00" 82°22'30"
38°00'00" 37°57'30" 37°55'00" 37°52'30"



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000 - meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

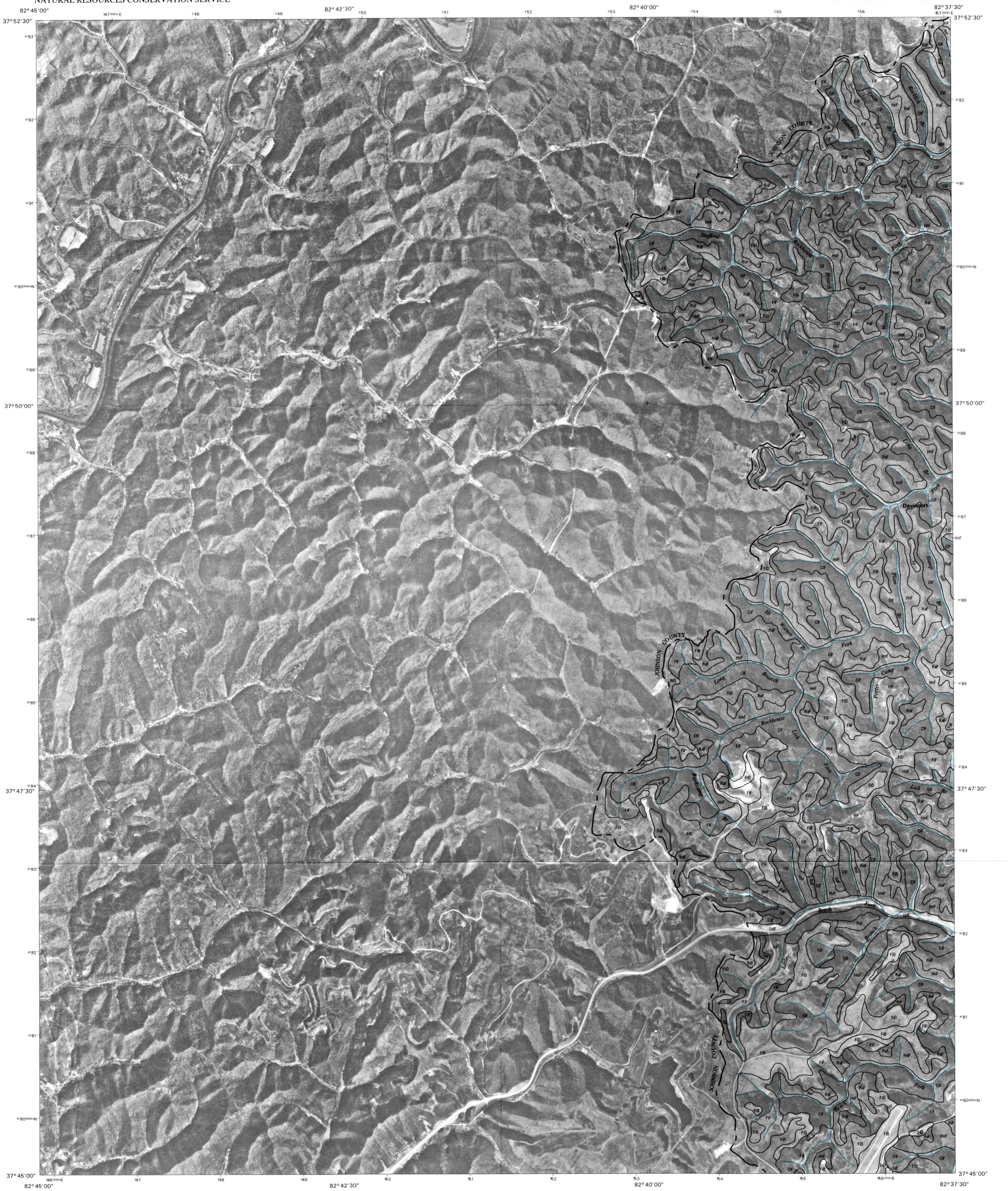
KILOMETERS

INDEX TO ADJOINING 7.5 MAPS

1	2	3	1 LOUISA
4		5	2 RADNOR
6	7	8	3 KIAHSVILLE
			4 MILO
			5 WILSONDALE
			6 INEZ
			7 KERMIT
			8 NAUGATUCK

WEBB, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 17 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000 - meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1 SITKA
2 RICHARDSON
3 MILO
4 PAINTSVILLE
5 INEZ
6 PRESTONSBURG
7 LANCER
8 THOMAS

INDEX TO ADJOINING 7.5 MAPS

OFFUTT, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 18 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
INEZ QUADRANGLE
SHEET NUMBER 19 OF 25

82°37'30" 82°35'00" 82°32'30" 82°30'00"
37°52'30" 37°50'00" 37°47'30" 37°45'00"

Tomahawk
Inez
Davisport
Debord
Davilla

This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000 - meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

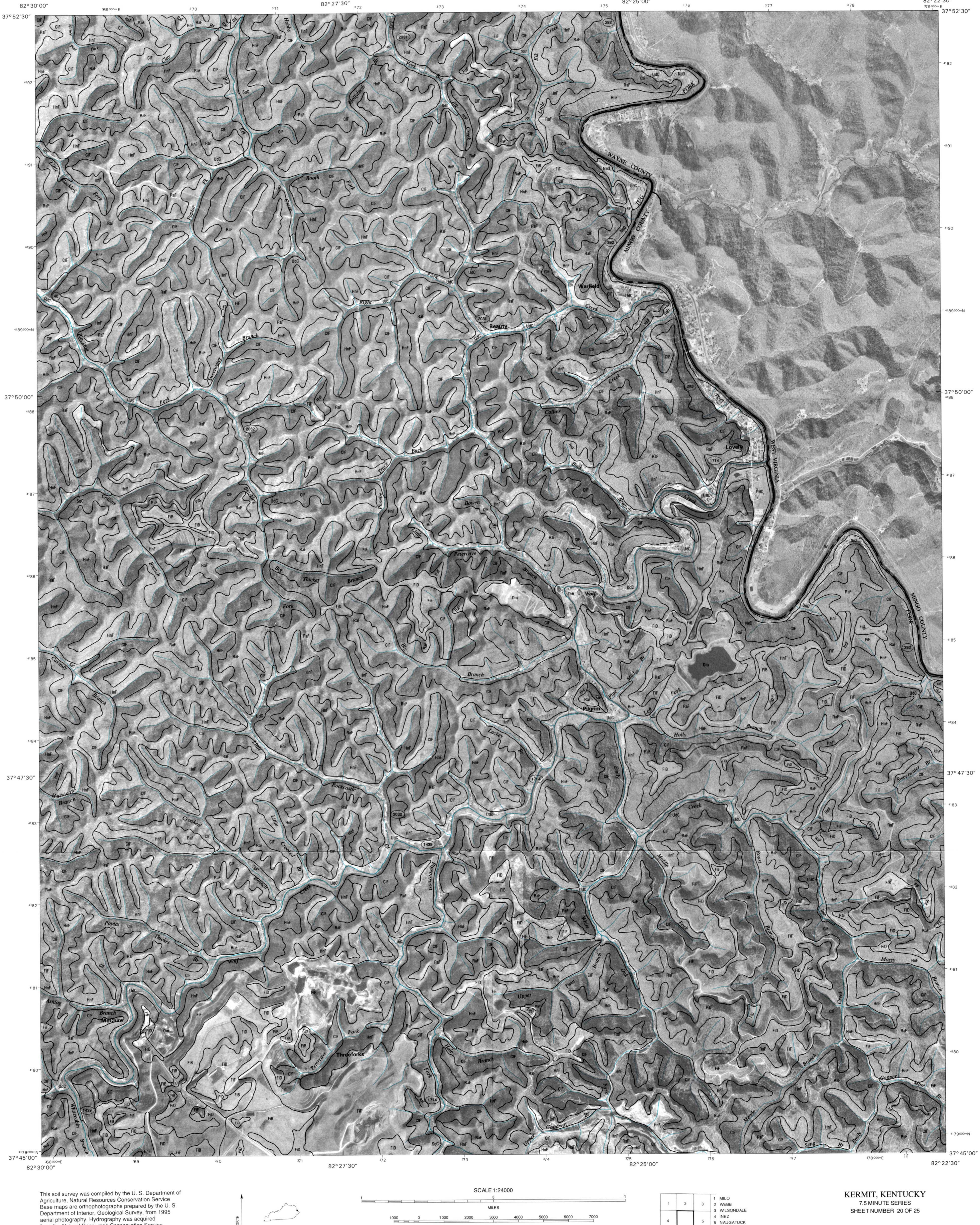
KILOMETERS

INDEX TO ADJOINING 7.5 MAPS

1 RICHARDSON
2 MILO
3 WEBB
4 OFFUTT
5 KERMIT
6 LANCER
7 THOMAS
8 VARNEY

INEZ, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 19 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service
Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000 - meter ticks: Universal Transverse Mercator, zone 17.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1 MILO
2 WEBB
3 WILSONDALE
4 INEZ
5 NAUGATUCK
6 THOMAS
7 VARNEY
8 WILLIAMSON

INDEX TO ADJOINING 7.5 MAPS

KERMIT, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 20 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
NAUGATUCK QUADRANGLE
SHEET NUMBER 21 OF 25

This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000 - meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3	1 WEBB 2 WILSONDALE 3 TRACE
4		5	4 KERMIT 5 MYRTLE 6 VARNEY
6	7	8	7 WILLIAMSON 8 DELBARTON

INDEX TO ADJOINING 7.5 MAPS

NAUGATUCK, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 21 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
LANCER QUADRANGLE
SHEET NUMBER 22 OF 25

This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service
Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000 - meter ticks: Universal Transverse Mercator, zone 17.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

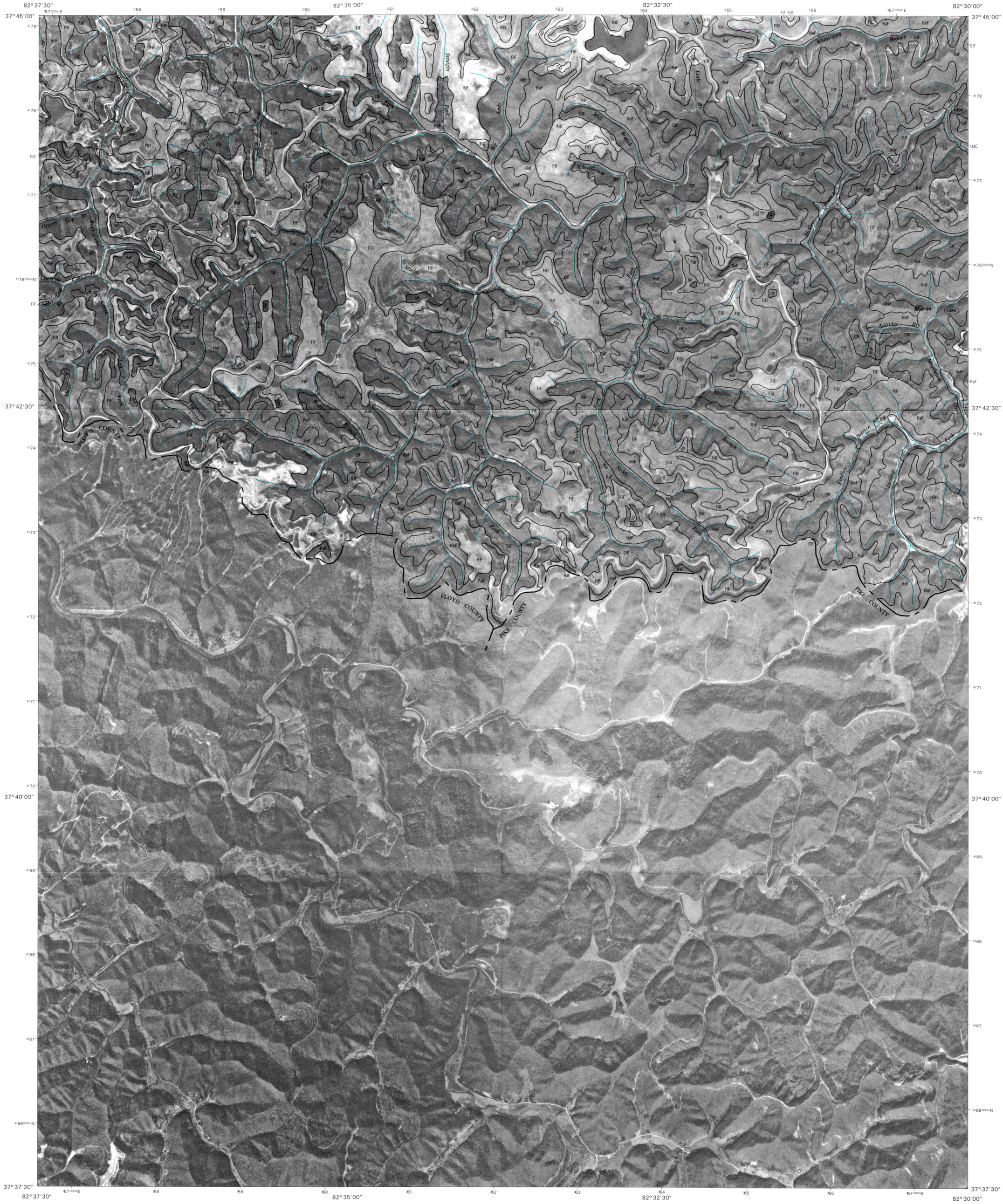
1	2	3	1 PAINTSVILLE 2 OFFUTT 3 INEZ
4		5	4 PRESTONSBURG 5 THOMAS 6 MARTIN
6	7	8	7 HAROLD 8 BROAD BOTTOM

INDEX TO ADJOINING 7.5 MAPS

LANCER, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 22 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
THOMAS QUADRANGLE
SHEET NUMBER 23 OF 25



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service
Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000 - meter ticks: Universal Transverse Mercator, zone 17.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

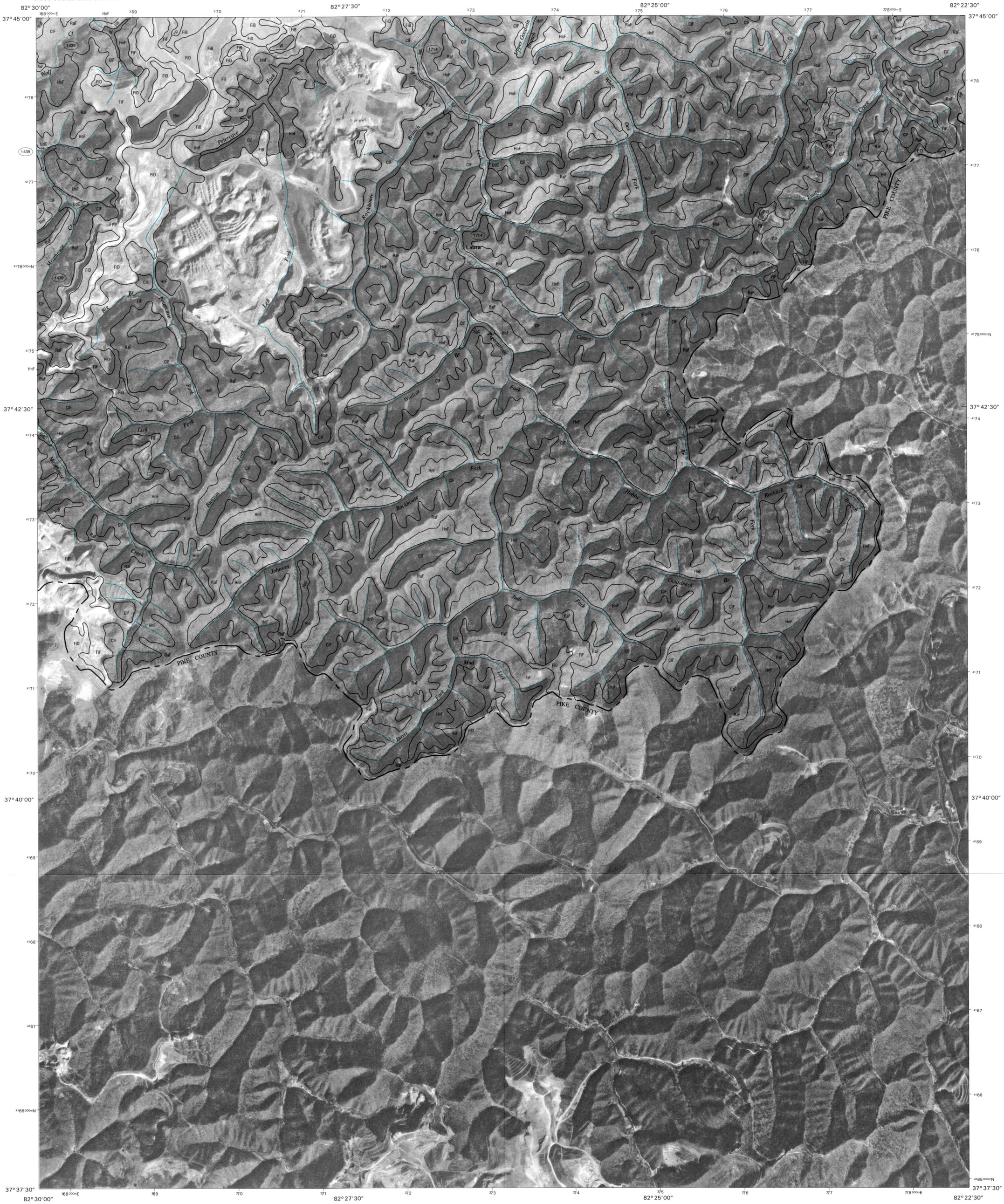
1	2	3	1 OFFUTT 2 INEZ 3 KERMIT
4		5	4 LANCER 5 VARNEY
6	7	8	6 HAROLD 7 BROAD BOTTOM 8 META

INDEX TO ADJOINING 7.5 MAPS

THOMAS, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 23 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
VARNEY QUADRANGLE
SHEET NUMBER 24 OF 25



This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service
Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000 - meter ticks: Universal Transverse Mercator, zone 17.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES: 1 0 1

FEET: 1000 0 1000 2000 3000 4000 5000 6000 7000

KILOMETERS: 1 0 1

1	2	3	1 INEZ
4		5	2 KERMIT
6	7	8	3 NAUGATUCK
			4 THOMAS
			5 WILLIAMSON
			6 BROAD BOTTOM
			7 META
			8 BELFRY

INDEX TO ADJOINING 7.5 MAPS

VARNEY, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 24 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LAWRENCE AND MARTIN COUNTIES, KENTUCKY
WILLIAMSON QUADRANGLE
SHEET NUMBER 25 OF 25

This soil survey was compiled by the U. S. Department of Agriculture, Natural Resources Conservation Service Base maps are orthophotographs prepared by the U. S. Department of Interior, Geological Survey, from 1995 aerial photography. Hydrography was acquired from the Natural Resources Conservation Service.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000 - meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

1	2	3	1 KERMIT 2 NAUGATUCK 3 MYRTLE
4		5	4 VARNEY 5 DELBARTON 6 META
6	7	8	7 BELFRY 8 MATEWAN

INDEX TO ADJOINING 7.5 MAPS

WILLIAMSON, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 25 OF 25